

**Project EASI-ED
Configuration Management Plan
for the
U.S. Department of Education**



December 1, 1997

FINAL

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PROJECT EASI/ED
Configuration Management Plan

Table of Contents

	<u>Page</u>
1. INTRODUCTION	1
1.1 BACKGROUND	1
1.2 PURPOSE AND SCOPE	2
1.3 CONFIGURATION MANAGEMENT OVERVIEW	3
1.3.1 Configuration Management Organization Requirements	4
1.3.2 Configuration Identification Requirements	5
1.3.3 Configuration Control Requirements	5
1.3.4 Configuration Status Accounting Requirements	5
1.3.5 Configuration Auditing Requirements	6
1.4 INTERFACE OF PROJECT EASI/ED CM AND TITLE IV SYSTEM CM	6
1.5 DOCUMENT ORGANIZATION	6
1.6 REFERENCES	7
2. PROJECT EASI/ED CONFIGURATION MANAGEMENT ORGANIZATION	10
2.1 PROJECT EASI/ED CM ORGANIZATIONAL STRUCTURE	10
2.2 CM ORGANIZATIONAL RESPONSIBILITIES	12
2.2.1 Configuration Management Administration	12
2.2.2 Configuration Control Boards	13
2.2.3 Change Review Board	15
3. CONFIGURATION IDENTIFICATION	17
3.1 PROJECT EASI/ED CI CATEGORIES	17
3.1.1 Documentation	17
3.1.2 Software	18
3.1.3 Hardware	18
3.2 BASELINE ESTABLISHMENT	18
3.2.1 Individual Configuration Item Baseline Establishment	19
3.2.2 Project EASI/ED Subproject Baseline Establishment	19
3.2.3 Project EASI/ED System Baseline Establishment	21
3.3 CONFIGURATION ITEM IDENTIFICATION SCHEMA	21
3.4 CONFIGURATION ITEM SELECTION PROCEDURES	23
3.4.1 Project EASI/ED Individual Configuration Item Selection Procedures	23
3.4.2 Subproject Individual Configuration Item Selection Procedures	24
3.4.3 Subproject Baseline Configuration Item Selection Procedure	25
3.4.4 System Baseline Configuration Item Selection Procedure	25
3.5 CONFIGURATION ITEM KEY CHARACTERISTICS	26
4. CONFIGURATION CONTROL	27
4.1 CHANGE REQUEST CLASSIFICATION	27
4.1.1 Class I Change Requests	27
4.1.2 Class II Change Requests	28
4.2 CHANGE REQUEST IDENTIFICATION SCHEMA	28
4.3 CHANGE PROCESSING	29
4.3.1 Project EASI/ED CR Processing	30
4.3.2 Project EASI/ED Subproject CR Processing	32

Table of Contents (Cont d)

	<u>Page</u>
4.3.3 Current Title IV System Change Request Processing.....	34
4.3.4 Emergency Change Procedures.....	35
4.3.5 Version Control.....	35
4.3.5.1 Individual CI Version Control	35
4.3.5.2 Project EASI/ED Subproject Baseline Version Control.....	36
4.3.5.3 Project EASI/ED System Baseline Version Control.....	37
4.4 AUTOMATED TOOLS FOR CONFIGURATION CONTROL.....	37
5. CONFIGURATION STATUS ACCOUNTING	38
5.1 CM LIBRARY	38
5.1.1 CI Check-out Procedure.....	39
5.1.2 CI Check-in Procedure.....	40
5.2 BACKUP AND RECOVERY PROCESS AND PROCEDURES.....	40
5.2.1 Backup Process.....	40
5.2.2 CM Library Backup Procedure.....	42
5.2.3 Recovery Process	43
5.2.4 Recovery Procedure	44
5.3 CONFIGURATION MANAGEMENT REPORTING.....	44
5.3.1 Periodic Reports	45
5.3.1.1 Class I CR Report	45
5.3.1.2 Class II CR Report	46
5.3.1.3 CR Review Report	46
5.3.1.4 Project EASI/ED CR Report.....	47
5.3.1.5 Project EASI/ED CI Report.....	47
5.3.1.6 Project EASI/ED Baseline Report.....	48
5.3.1.7 Project EASI/ED System CI Report.....	48
5.3.1.8 Project EASI/ED CI Cross-Reference Report.....	49
5.3.2 Aperiodic Reports	50
5.3.2.1 CMA IA Report	50
5.3.2.2 Project EASI/ED FCA Report	51
5.3.2.3 Project EASI/ED PCA Report	51
5.3.2.4 Project EASI/ED CI Deficiencies Report	52
5.3.3 Ad Hoc Reports.....	53
6. CONFIGURATION AUDIT	54
6.1 CMA INTERNAL AUDIT PROCEDURE	54
6.1.1 Inputs.....	54
6.1.2 Output.....	54
6.1.3 Roles.....	55
6.1.4 Steps	55
6.2 FUNCTIONAL CONFIGURATION AUDIT PROCEDURE.....	56
6.2.1 Inputs.....	56
6.2.2 Output.....	56
6.2.3 Roles.....	57
6.2.4 Steps	57
6.3 PHYSICAL CONFIGURATION AUDIT PROCEDURE.....	58
6.3.1 Inputs.....	58
6.3.2 Output.....	58
6.3.3 Roles.....	58
6.3.4 Steps	59

Table of Contents (Cont d)

	<i>Page</i>
7. CONFIGURATION MANAGEMENT TRAINING.....	61
8. CONTRACTOR AND VENDOR CONFIGURATION MANAGEMENT CONTROL.....	63
8.1 CONTRACTOR/SUBCONTRACTOR REQUIREMENTS	63
8.2 VENDOR CONFIGURATION MANAGEMENT CONTROLS	64
Appendix A ACRONYMS AND DEFINITIONS	
Appendix B GLOSSARY	
Appendix C PROJECT EASI/ED CONFIGURATION MANAGEMENT PROCEDURES	

Project EASI/ED Configuration Management Plan

Table of Figures

	<i><u>Page</u></i>
FIGURE 2-1. PROJECT EASI/ED CONFIGURATION MANAGEMENT ORGANIZATIONAL STRUCTURE.....	10
FIGURE 2-2. CRB, CMA, AND CCB RELATIONSHIPS.....	11
FIGURE 3-1. INITIAL BASELINE MILESTONES FOR CIs.....	19
FIGURE 3-2. PROJECT EASI/ED LIFE CYCLE REVIEWS AND BASELINES.....	21
FIGURE 3-3. PROJECT EASI/ED CI IDENTIFICATION SCHEMA.....	22
FIGURE 3-4. PROJECT EASI/ED INITIAL CI SELECTION PROCESS.....	23
FIGURE 3-5. PROJECT EASI/ED SUBPROJECT INITIAL CI SELECTION PROCESS.....	24
FIGURE 4-1. PROJECT EASI/ED CHANGE REQUEST IDENTIFICATION SCHEMA.....	28
FIGURE 4-2. PROJECT EASI/ED CHANGE CONTROL PROCESS.....	29
FIGURE 4-3. PROJECT EASI/ED CR PROCESS.....	30
FIGURE 4-4. PROJECT EASI/ED SUBPROJECT CHANGE PROCESS.....	32
FIGURE 4-5. CURRENT TITLE IV SYSTEM CHANGE REQUEST PROCESS.....	34
FIGURE 4-6. INDIVIDUAL CI VERSIONING.....	36
FIGURE 4-7. SUBPROJECT BASELINE CI VERSIONING.....	36
FIGURE 4-8. SYSTEM BASELINE CI VERSIONING.....	37
FIGURE 5-1. CI CHECK-OUT PROCEDURE.....	39
FIGURE 5-2. INCREMENTAL AND WEEKLY CM LIBRARY BACKUPS.....	41
FIGURE 5-3. WEEKLY AND MONTHLY CM LIBRARY BACKUPS.....	42
FIGURE 5-4. CI RECOVERY PROCESS.....	43

1. INTRODUCTION

Configuration management (CM) is the implementation and execution of processes and procedures that ensure the systematic and orderly control of a system throughout its life cycle. The *Project EASI/ED CM Plan* describes the processes and procedures that will be used to implement and execute CM for Project EASI/ED. Section 1 of the *Project EASI/ED CM Plan*:

- Provides background information regarding Project EASI/ED (Subsection 1.1).
- Describes the *CM Plan's* scope and purpose (Subsection 1.2).
- Provides an overview of the discipline of CM and a justification for CM (Subsection 1.3).
- Describes the interface between Project EASI/ED CM and Title IV CM processes (Subsection 1.4).
- Describes the *CM Plan's* content and organization (Subsection 1.6).
- Lists the information sources used during the Plan's development (Subsection 1.7).

1.1 Background

Project EASI (Easy Access for Students and Institutions) is an effort by members of the postsecondary education community to define and to implement a customer-focused "system" to support postsecondary education. The specific focus of Project EASI is on those processes and systems with which students, prospective students, and their families most directly interact. Within Project EASI, Project EASI/ED represents ED's initial effort to implement the Project EASI vision within the scope of its business processes and systems. ED's focus is on reengineering the 13 financial aid delivery systems and associated processes used to manage and deliver postsecondary student financial aid authorized under Title IV of the Higher Education Act of 1965, as amended.

Project EASI/ED is being developed using a tailored spiral methodology (*Project EASI/ED Program Management Plan, January 7, 1997*). This methodology encompasses seven life cycle phases through which the development effort will cycle iteratively over the course of the project. The phases are:

- Concept
- Definition
- Design
- Construction
- Test
- Implementation
- Operation

The concept phase of Project EASI was completed in January 1997, with documentation of the initial baseline of the Project EASI vision in the *Project EASI Information Strategy Plan (December 1996)* and in the *Project EASI Concept Document (revised final dated June 23, 1997)*. In December 1996, Project EASI/ED entered the definition phase of the life cycle, which is planned for completion in June 1997.

As Project EASI/ED progresses beyond the definition phase, ED envisions that multiple, parallel development or acquisition efforts will be undertaken to implement Project EASI/ED requirements. For example, some functional requirements may be met through outsourced services, some through commercial-off-the-shelf (COTS) software products, some through reuse of existing software or business logic, and some through custom-developed software. These separate development efforts will be designated as Project EASI/ED subprojects. The Project EASI/ED integrator is responsible for ensuring that these efforts all contribute effectively and efficiently to the realization of Project EASI/ED as a whole.

In conjunction with its implementation of Project EASI/ED, ED is initiating implementation of the "Band Strategy." The Band Strategy is an initiative to re-architect the contracts used to deliver ED's current Title IV systems and related services. Today, each Title IV system is operated and maintained under one or more separate contracts. Generally, these contracts bundle diverse services encompassing data center

support, software development, software maintenance, customer service, training, and a variety of manual processing (e.g., payment processing, mailing). Under the Band Strategy, these contracts will be revised so that data center support for all Title IV systems is delivered through a single vehicle -- comprising Band 1. All software maintenance and enhancement support will be delivered through one or more separate contracts comprising Band 2. All remaining services will be delivered under one or more contracts comprising Band 3. Through the Band Strategy, ED expects to reduce the costs for operating and maintaining the Title IV systems and to obtain higher quality service.

1.2 Purpose and Scope

The *Project EASI/ED Configuration Management Plan* provides detailed guidance for implementing configuration management (CM) of Project EASI/ED documentation, software, and hardware, and at the project-wide level. This CM Plan is not intended to provide comprehensive guidance for performing day-to-day CM activities on Project EASI/ED subprojects, but does provide the structured framework from which subproject processes and procedures should be developed. Each Project EASI/ED subproject will develop a CM plan documenting in detail the subproject CM processes and procedures, consistent with the overall guidance for Project EASI/ED. These CM Plans will incorporate the following aspects of this *CM Plan*:

- Configuration item identification schema.
- System and subsystem baselines.
- Change request classification schema.
- CM organizational components and hierarchy.
- Change request review and approval process.

Project EASI/ED CM encompasses:

- CM of Project EASI/ED documentation, hardware, and software.
- CM of Project EASI/ED subproject documentation, hardware, and software, as they relate to Project EASI/ED system baselines.
- Change requests from Project EASI/ED subprojects that impact Project EASI/ED.
- Change requests from ED's current Title IV systems that impact Project EASI/ED.
- Change requests from Project EASI/ED that impact ED's current Title IV systems.
- Change requests from ED's current Title IV systems that impact other Title IV systems.

This Project EASI/ED CM Plan describes:

- The Project EASI/ED CM organization and its responsibilities
- The processes and procedures to be applied throughout the Project EASI/ED life cycle.
- The relationships between existing Title IV system CM practices and Project EASI/ED CM processes and procedures.
- How CM controls will be applied towards Project EASI/ED products and changes to those products.
- How CM controls will be applied towards Title IV system changes that affect the design, development, or operation of products, subprojects, or systems within Project EASI/ED, or other Title IV systems.

The CM activities described in this plan will provide Project EASI/ED management the ability to identify, control, and manage all configuration items (CIs) comprising or related to Project EASI/ED. CIs are any document, hardware, or software item -- or aggregation of documents, hardware, or software -- requiring configuration control. The CM activities will also provide status reporting of all proposed, in process, approved, and disapproved changes to Project EASI/ED. In addition, the CM activities described in this plan will provide ED management with additional CM control of CIs by providing a mechanism for determining the impact of change requests from one Title IV system on other Title IV systems.

The *Project EASI/ED CM Plan* reflects recognized industry and Government concepts and practices. It is a living document. The *Project EASI/ED CM Plan* will be reviewed and updated at the end of each life cycle phase, along with other project documentation. These reviews will provide an appropriate forum for reassessing CM processes, procedures, and organization in light of specific decisions regarding implementation.

1.3 Configuration Management Overview

Configuration management is the implementation and execution of processes and procedures that ensure the systematic and orderly control of a system and its components throughout their life cycle. CM ensures system integrity by controlling changes to any component of a system. CM involves the disciplined application of technical and administrative management for four purposes:

1. Identify and document functional requirements and physical system component characteristics.
2. Control system component changes.
3. Record and report change request, processing and implementation status.
4. Audit system components to verify conformance to requirements, specifications, and/or technical documents.

CM is a key discipline in all project environments. It is directly related to project management and quality. Effective CM is necessary to:

- Prevent delivery of incorrect products.
- Avoid high rework costs of incorrect product builds.
- Provide processes for effective control of changes.
- Manage product information.
- Quantify the impact of changes.
- Ensure reliability and a quality environment.

CM benefits include:

- Improved management of requirements and change.
- Better impact analysis.
- Improved management of product information.
- More accurate project, and subproject status information.
- Increased support in managing risk.
- Greater synergy within systems, subprojects, projects.

The following items are typically subject to CM:

- All required documentation.
- All operational software and hardware components.
- All support software and hardware.
- Any additional items considered necessary, including test data, test cases, and other resources used to test the acceptability of a system component.

CM provides visibility into the status of evolving systems. Software developers, testers, project managers, Quality Assurance (QA) personnel, and customers benefit from CM information. CM answers the following:

- *What* changes were made to the system?
- *When* were the changes to the system made?

- *Who* made changes to the system?
- *Why* were the system changes made?

The CM discipline comprises five requirements categories:

- CM organization requirements.
- Configuration identification requirements.
- Configuration control requirements.
- Configuration status accounting requirements.
- Configuration auditing requirement.

These five categories are the foundation for successful CM. Subsections 1.3.1 through 1.3.5 describe each of the five categories.

1.3.1 Configuration Management Organization Requirements

A CM organization regulates established CM practices (such as configuration identification, control, status accounting, and auditing) and facilitates coordination among systems that interface or have design, functional, and/or operational dependencies. The CM organization's operational objectives include:

- Verifying that CIs meet their specified requirements.
- Ensuring that CIs are recorded with all known cross-system interfaces.
- Tracking CI status through auditing activities, and taking appropriate corrective action when problems are discovered.
- Confirming that representatives from all affected systems agree on the configuration of pertinent CIs and changes to the configuration of those pertinent CIs.
- Prioritizing change requests.

The CM organization must comprise individuals who:

- Intimately understand the technical architectures and technical features of the interfacing systems, or who have readily available technical support in these areas.
- Possess authoritative influence and can control or provide direction regarding CM responsibilities and assignments.
- Have a vested interest in the successful integration and certification of the enterprise-wide system.
- Possess authoritative influence on resource allocation decisions.
- Have a thorough understanding of CM concepts and procedures.
- Have considerable system life cycle experience.
- Can build consensus and facilitate cooperation within diverse, multi-system development scenarios.

1.3.2 Configuration Identification Requirements

Configuration identification involves classifying a system's structure, uniquely identifying individual system components, and documenting the components' functional and physical characteristics. The goals of configuration identification are to identify the system's components throughout the life cycle and to provide traceability between a system and related system products. Configuration identification answers the following: *What is the system configuration? What are the system components? and What is the version of this system component?*

Configuration identification activities include:

- Selecting items to be placed under configuration control.
- Creating a nomenclature for uniquely identifying system components.
- Identifying the various system component versions.
- Defining relationships and interfaces among various system components.

1.3.3 Configuration Control Requirements

Configuration control begins after CIs are formally identified. Configuration control refers to the evaluation, coordination, approval or disapproval, and implementation of changes. It also involves managing release of, and changes to, system components throughout the system life cycle. The goal of configuration control is to establish mechanisms that will help ensure the production and maintenance of quality system components. Configuration control answers the following: *What is controlled? How are changes to system components controlled? and Who controls system changes?*

Configuration control activities include:

- Defining the change process.
- Establishing change control policies and procedures.
- Maintaining system component baselines.
- Processing system component changes.
- Tracking and documenting changes.
- Controlling releases of system components.

1.3.4 Configuration Status Accounting Requirements

Configuration status accounting activities document and report information describing specific configuration items and their corresponding status. To manage CIs effectively, the CM organization must have access to this status information. The goal of status accounting is to provide a status record of all CIs, thus maintaining the traceability of all changes to a CI throughout its life cycle. Configuration status accounting answers the following: *What is the current configuration status for a CI? What are the current changes being considered? What changes have been made to the CI? and How many components will be affected by this change?*

Configuration status accounting activities include:

- Determining types of logs and reports required.
- Tracking the status of CIs.
- Tracking the status of changes to the system.
- Reporting system status.
- Recording and reporting on CM activities.

1.3.5 Configuration Auditing Requirements

The goals of configuration auditing are to:

- Ensure that CM processes and procedures are properly applied and support the organization's goals and objectives.
- Verify that all CIs are correctly identified, described, cross referenced and produced.
- Verify that all approved changes to a CI are completed.

For application software, two formal audits are widely used: Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA). The FCA verifies that the software satisfies software requirements as stated in system requirements specifications. The PCA determines whether or not the design and reference documents represent the software that was built. Configuration audit answers the following: *Does the CI satisfy the requirements?* and *Are all changes incorporated in this version of the CI?*

Configuration audit activities include:

- Defining audit schedule and procedures.
- Performing audits of the established baselines.
- Documenting and reporting audit results.

1.4 Interface of Project EASI/ED CM and Title IV System CM

As Project EASI/ED progresses, ED managers will need to make informed decisions regarding how changes proposed for the existing Title IV systems may affect Project EASI/ED implementation and/or other Title IV systems, and how best to allocate resources across all of the ED systems. Given this, interfaces between ED's current Title IV system CM activities and Project EASI/ED CM activities will be required throughout the Project EASI/ED life cycle. Project EASI/ED system development and implementation is a Program Systems Service-level activity.

To facilitate the necessary exchange of CM information at the Service level, ED's individual Title IV systems' Configuration Control Boards (CCBs) will provide all approved Class I change requests (defined in Section 4.1) to the Project EASI/ED Configuration Management Administration (CMA) group (defined in Section 2.1). The CMA will coordinate the impact analysis of each change request to determine if there are impacts to Project EASI/ED and/or other Title IV systems. Similarly, ED's Title IV systems' CCBs will review Project EASI/ED change requests to assess any impact on current Title IV systems. The details of this interface approach are described in the configuration control section (Section 4) of this *CM Plan*. Although this interface is necessary to facilitate management decisions regarding the Title IV systems, the Project EASI/ED *CM Plan* is in no way intended to replace the CM plans already in use for the individual Title IV systems. Rather, the procedures in this plan were written to enable the necessary information to be exchanged at the Service level with minimum impact on the existing contracts and procedures.

1.5 Document Organization

The remainder of the *Project EASI/ED CM Plan* is organized into the following sections:

Section 2 - Project EASI/ED Configuration Management Organization. This section describes the Project EASI/ED CM organization and control board structures, and their relationships with other organizations, boards, and projects. In addition, this section identifies the responsibilities of each Project EASI/ED CM organization component.

Section 3 - Configuration Identification. This section describes the process for configuration identification, including CI selection, baseline establishment, CI identification schema and identification methods.

Section 4 - Configuration Control. This section describes the process for maintaining configuration control of all identified CIs developed or maintained by Project EASI/ED and/or Project EASI/ED subprojects. It describes the process for determining the impact of change requests on Project EASI/ED and Title IV systems. It describes the baseline change process, how to classify changes, how to request a change, and the process for processing a change request for each CI type (documentation, hardware, and software). A recommended CM tool is identified, along with the basis for that recommendation.

Section 5 - Configuration Status Accounting. This section describes the process used to provide configuration status accounting. This section also describes the processes and procedures for successful operation of CM libraries for documentation, hardware, and software. Topics covered include: library access control and security, retention policies and procedures, backup and disaster plans and procedures, and recovery processes.

Section 6 - Configuration Auditing. This section describes the approach for performing configuration audits.

Section 7 - Configuration Management Training. This section describes the kinds and amounts of training required to ensure effective performance of the CM activities by the CM organization and related groups.

Section 8 - Contractor and Vendor Configuration Management Control. This section describes the methods used to ensure contractor/vendor compliance with Project EASI/ED CM requirements.

Detailed information supplementing the sections listed above is presented in the following appendices:

Appendix A - Acronyms and Definitions. This appendix presents a list of acronyms used in the *Project EASI/ED CM Plan* and their corresponding definitions.

Appendix B - Glossary of Configuration Management Terms. This appendix provides a list of standard CM terms with their definitions.

Appendix C - Project EASI/ED Configuration Management Procedures. This appendix provides procedures for the CM boards identified in this *CM Plan*.

1.6 References

The information sources used during development of the *Project EASI/ED CM Plan* are listed below.

US Department of Education

-----, *ACT Multiple Data Entry System: Configuration Control Plan*, 1996-1997 Cycle.

-----, *Campus Based System: CM Plan*, September 25, 1984.

-----, *CBMI Postsecondary Education Participants System: CM Plan v 1.0*, May 3, 1996.

-----, *Configuration Management Plan for the Education Department Central Automated Processing System/Integration Support Services (EDCAPS/ISS)*, Contract Number DCA100-94-D-0015, Delivery Order 125, CDRL A005, BDM Enterprise Integration Team, September 18, 1996.

- , *Direct Loan Servicing System: CM Plan*, February 25, 1994.
- , *Grant Administration and Payment System (GAPS) Configuration Management Procedures*, Technical Infrastructure Team.
- , *I-Net Multiple Data Entry System: Configuration Control Plan*, February 7, 1996.
- , *Loan Origination Subsystem: CM Plan (Draft)*, October 2, 1996.
- , *National Computer Systems Central Processing System: Configuration Control Plan 1996-97 Cycle*.
- , *National Computer Systems Title IV Wide Area Network: CM*, RFP-94-001.
- , *Postsecondary Education Participants System: CM Procedures Oracle environment for the CBMI Development Team v 1.0*, May 3, 1996.
- , *PRC CM Operations Pell Grant Recipient and Financial Management System Configuration Control Board*, Product task order number 004.
- , *Project EASI/ED Business Area Requirements Document, Volumes I and II*, Price Waterhouse LLP, July 1, 1997.
- , *Project EASI/ED Business Area Requirements Document, Volumes I and II*, Price Waterhouse LLP, July 1, 1997.
- , *Project EASI/ED Concept Document, Revised Final*, Price Waterhouse LLP, June 1997.
- , *Project EASI/ED Current Systems Models, Volumes I and II*, Price Waterhouse LLP, April 16, 1997.
- , *Project EASI/ED Program Management Plan*, Price Waterhouse LLP, December 1996.
- , *Project EASI/ED Technical Vision and Target Architecture (TVTA) Report, Volumes I and II*, Price Waterhouse LLP, September 15, 1997.
- , *Student Financial Assistance Loan Programs: CM Plan v.1.3*, June 30, 1996.
- , *Technical Advisory Services (TAS) Report*, Price Waterhouse LLP, February, 1997.

Department of Defense (DoD) Standards

- DoD MIL-STD-2549, *Configuration Management Data Interface Standard*, Department of Defense.
- DoD MIL-STD-483A, *Configuration Management Practices for Systems, Equipment, Munitions, and Computer Software*, Department of the Air Force, June 1985.
- DoD MIL-STD-498, *Software Development and Documentation*, Department of Defense.
- DoD MIL-STD-973, *Military Standard for Configuration Management*, Department of Defense.

Other References

- B. Conway, *Software Change Management Best Practices, Part 2*, Gartner Group, July 25, 1995.
- Bounds, Nadine, M., and Dart, Susan, A., *Configuration Management (CM) Plans: The Beginning to Your CM Solution*, Software Engineering Institute, Carnegie-Mellon University, July 1993.

Dart, Susan, A., *Concepts in Configuration Management Systems*, Software Engineering Institute, Carnegie-Mellon University.

Ken Rigby, *System Engineering Management Plan*, MANAGING STANDARDS V3.9, 1996.

Naval Air Systems Command (NAVAIR), *Generic Software Configuration Management Plan*, Computer Resources Group (CRG), September 1, 1995.

Naval Air Systems Command (NAVAIR), *Software Configuration Management Process Definition*, Computer Resources Group (CRG), September 1, 1995.

2. PROJECT EASI/ED CONFIGURATION MANAGEMENT ORGANIZATION

This section describes the Project EASI/ED CM organizational structure, its boards and groups, and their relationships among themselves as well as with other organizations, boards, systems and subprojects. In addition, this section describes the Project EASI/ED CM responsibilities, staffing, and staffing skill sets.

2.1 Project EASI/ED CM Organizational Structure

The Project EASI/ED CM organizational structure comprises three main groups:

- Change Review Board (CRB).
- Configuration Management Administrative group (CMA).
- Project EASI/ED subproject Configuration Control Board (CCB).

Figure 2-1, below, depicts the Project EASI/ED CM organizational structure.

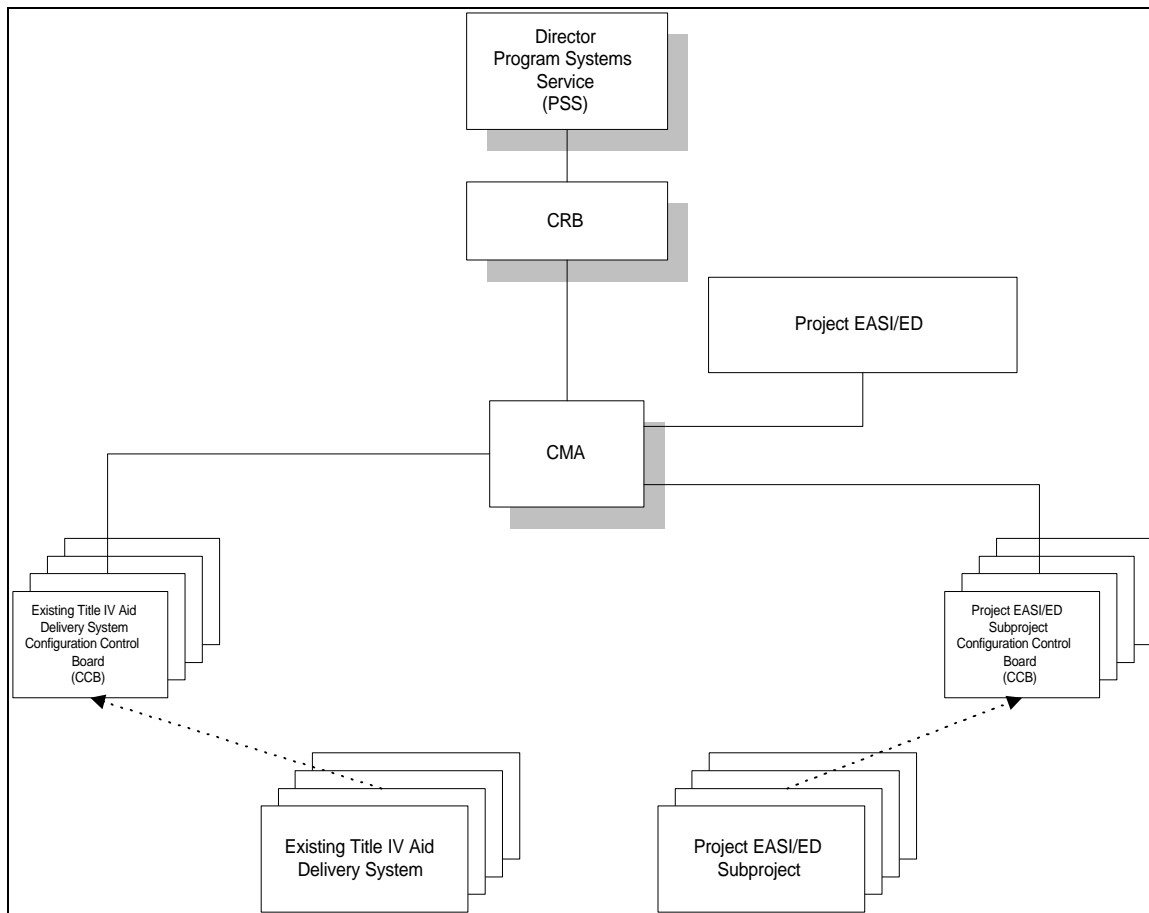


Figure 2-1. Project EASI/ED Configuration Management Organizational Structure.

The CRB -- chaired by the Director, Program Systems Service -- is the main decision board that has the authority and responsibility to review, question, and ultimately approve or disapprove CRs that impact Project EASI/ED or Title IV systems. The CRB reviews CRs from the current Title IV systems, Project EASI/ED, and any Project EASI/ED subprojects.

The CMA is the main administrative body of the Project EASI/ED CM organization. The CMA controls Project EASI/ED configuration identification, configuration control, configuration status accounting, and configuration auditing. The CMA, under the leadership of the Project EASI/ED configuration manager, also serves a CCB function for Project EASI/ED Class II CRs. The CMA's primary responsibility is to coordinate and summarize the impact analyses of all Project EASI/ED Class I CRs, and Class I CRs approved by Project EASI/ED subproject CCBs or approved by current Title IV system CCBs. Figure 2-2 illustrates the basic relationship between the CRB, CMA, and the CCBs.

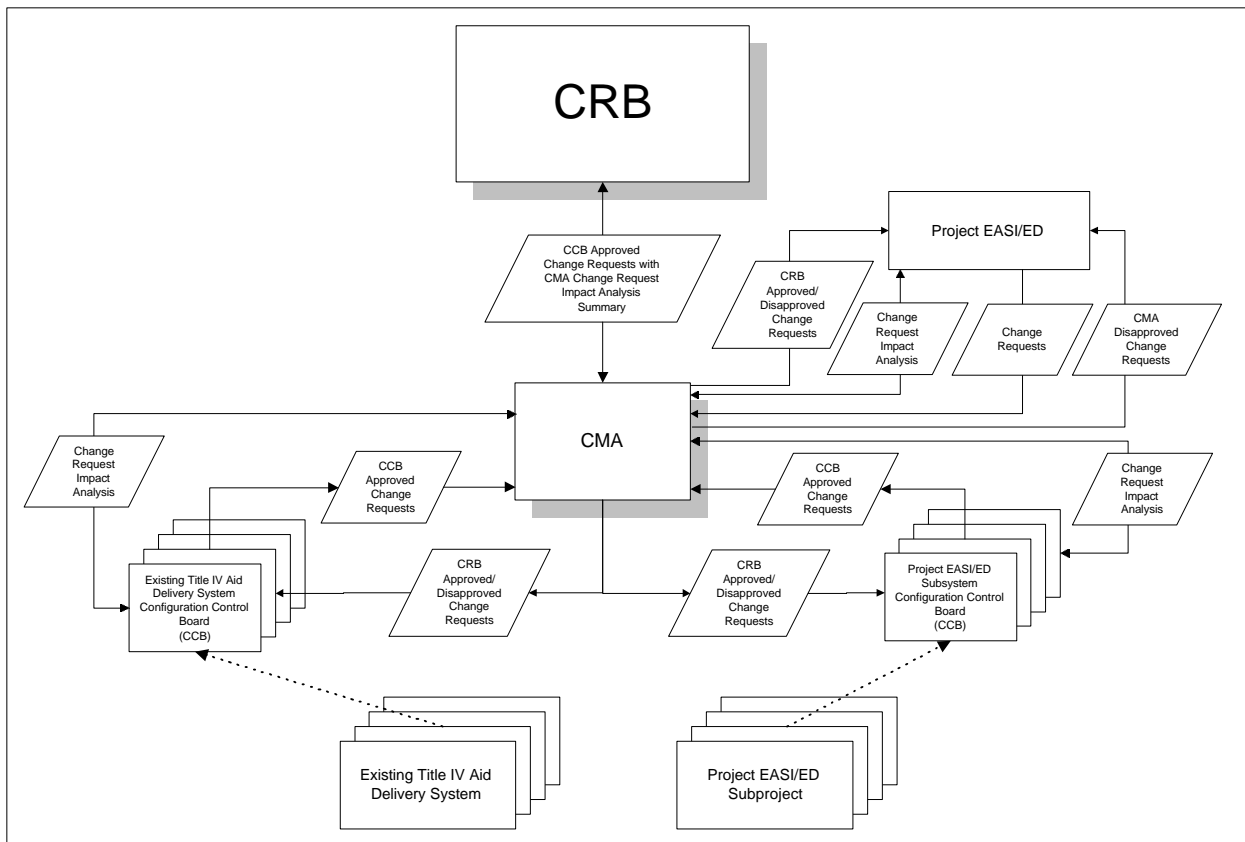


Figure 2-2. CRB, CMA, and CCB Relationships.

The CRB and CMA function independently of all Title IV systems and Project EASI/ED subprojects. This independence will help to ensure that the Project EASI/ED CM processes and procedures are not unduly influenced by the priorities of any single participating Title IV system or Project EASI/ED subproject.

2.2 CM Organizational Responsibilities

The Project EASI/ED CM organization is responsible for:

- Establishing and maintaining configuration control over Project EASI/ED documentation, hardware, software and all their related items.
- Augmenting configuration control of CIs within the current Title IV systems and Project EASI/ED subprojects that affect the design, development, implementation, and/or operation of Project EASI/ED or other Title IV systems.

2.2.1 Configuration Management Administration

The CMA is responsible for the implementing, controlling, operating, and maintaining all aspects of CM and CM administration for Project EASI/ED. CMA responsibilities include:

- Establish, document, monitor, and amend the procedures for the CMA and CRB.
- Design, develop, implement, operate, maintain, and enhance the automated Project EASI/ED project-wide CM tool.
- Coordinate, execute, and report on configuration audits as described in Section 6 of this *CM Plan*.
- Develop, coordinate, and implement all CM training courses and materials.
- Provide all required CM information to support the Project EASI/ED integration activities, the configuration manager, and related boards in performing their CM responsibilities.

The CMA will coordinate the impact analysis of all Project EASI/ED Class I CRs, and CCB-approved Class I CRs for Project EASI/ED subprojects and for the current Title IV systems. Regardless of whether the impact analysis shows that external CIs are impacted or not impacted by a Class I CR, the CMA will:

- Develop a summary impact analysis statement.
- Forward the CR and the impact analysis summary to the CRB for review and approval or disapproval.
- After the CRB decision, the CMA will notify the originator and all impacted parties of the CRB decision. If the CRB decision is a disapproval, the CMA will provide the CRB disapproval rational.

Decisions regarding Class I CRs will be made by the CRB. The CMA will document the CRB results, and will facilitate transmission of CRB results to Project EASI/ED managers, Project EASI/ED subproject managers, and/or Title IV system managers.

The CMA initially will comprise the following staff:

- Project EASI/ED configuration manager.
- Configuration librarian.
- CM operations analysts (as needed).

In addition, representatives of Project EASI/ED, of Project EASI/ED subprojects, and of the current Title IV systems will be required to support the CMA in conducting impact analyses of Class I CRs. Specific roles and responsibilities within the CMA are described in the following paragraphs.

The Project EASI/ED configuration manager is responsible for:

- Supervising and controlling all Project EASI/ED CM activities (i.e., configuration identification, configuration control, configuration status accounting, configuration auditing).
- Managing the CMA in day-to-day performance of their duties.
- Ensuring that CM processes and procedures defined in the *Project EASI/ED CM Plan* are appropriately implemented and operated, and that the *CM Plan* is updated at key life cycle milestones and as required to maintain sound CM discipline on the project.
- Serving as a member of the CRB.
- Providing guidance to CM staff on Project EASI/ED subprojects.
- Facilitating communication with other Title IV system managers regarding CM issues.

The CM librarian is responsible for:

- Initial set up of the CM tool, tailored to Project EASI/ED.
- Developing and delivering training.
- Initially populating CM tool with past CIs.
- Monitoring incoming CIs as they are identified.
- Monitoring incoming CRs.
- Supporting CCBs use of the CM tool.
- Participating in configuration audits.
- Performing backup and recovery of the CM tool database.

CM operations analysts are responsible for:

- Initial set up of the CM tool, tailored to Project EASI/ED.
- Supporting the CRB -- generate reports, take notes, track results, notify other configuration managers of results.
- Supporting Project EASI/ED CI and CR processes and procedures.
- Helping coordinate impact analyses.
- Synthesizing impact information into summary impact analysis.
- Participating in configuration audits.

2.2.2 Configuration Control Boards

Each Project EASI/ED subproject will have a CCB and a corresponding CM organization. Each of the Project EASI/ED subprojects will, within 30 days of subproject kick-off:

- Attend all required CM training as outlined in Section 7 of this *CM Plan*.
- Determine the appropriate CCB size and composition based on the anticipated number of CIs, number and frequency of deliverables, and availability and skill set of staff needed to ensure complete and timely execution of the CM responsibilities detailed in this *CM Plan*.
- Establish and document their own set of operating procedures to ensure complete and timely execution of all CM and CCB responsibilities.
- Present the documented procedures to the Project EASI/ED project manager and the Project EASI/ED integration manager for review, comment, and approval.
- Establish the subproject CCB.

Each CCB will:

- Provide all CM managerial and administrative support necessary to the subproject, CRB, CMA, and other CCBs to ensure execution of and compliance with the processes and procedures outlined in this CM Plan for each of the four major CM activities.
- Be responsible for loading, maintaining, and tracking all CI information for their subproject in the Project EASI/ED automated CM tool.
- Review all CRs within the subproject and approve or disapprove those CRs.
- At a minimum of once a week, submit all approved Class I CRs to the CMA for further evaluation and CRB review.
- Support CMA impact analyses of other Class I CRs.
- Appear before the CRB, or arrange for appropriate staff to appear before the CRB, to provide subject matter expertise.
- Ensure that no action is taken on CCB-approved Class I CRs prior to CRB approval.
- Monitor and ensure that all changes from all approved CRs for the subproject are completed according to the approved CR.

Each subproject will have the following CM staff:

- Subproject configuration manager.
- Subproject CM librarian.
- Subproject CM operations analysts (as required).

These staff will fulfill comparable roles to those defined for the CMA staff, but at the subproject level.

Subproject CCBs will comprise, at a minimum:

- Subproject manager.
- Subproject configuration manager.
- Subproject development manager (if applicable).
- Subproject operations manager (if applicable).
- ED management representative(s).
- Project EASI/ED integrator representative.

Other staff may be identified as permanent members of the subproject CCB, or may be requested to participate in specific CCB meetings as required to explain and fully discuss specific CM issues and CRs.

The procedure for conducting the CCB meeting is described in detail in Appendix C.

For ED's current Title IV systems, the existing Title IV system CCBs will continue to function in compliance with their respective processes and procedures as outlined in their respective CM plans. In addition, each of these CCBs will:

- Provide once a week, as a minimum, all approved Class I CRs to the CRB, via the CMA, for review.
- Ensure that no action is taken on CCB-approved Class I CRs prior to the CRB's approval.
- Support the CRB, the CMA, and other CCB CM activities related to determining the impacts of CRs.

2.2.3 Change Review Board

The CRB is the governing board for Project EASI/ED CM. The CRB is chaired by the Director, Program Systems Service, who is responsible for making final decisions regarding Project EASI/ED CRs, Project EASI/ED subproject Class I CRs, and Class I CRs for the current Title IV systems. The CRB is supported by the CMA, which provides administrative support and facilitates communication of CRB directions and decisions.

The CRB comprises the following staff, at a minimum:

- Director, Program Systems Service (CRB Chairman).
- Project EASI/ED project manager.
- Project EASI/ED integration manager.
- Project EASI/ED configuration manager.
- Title IV systems project managers or configuration managers (as appropriate).
- Scribe.

Specific roles and responsibilities within the CRB are described in the following paragraphs.

The Director, Program Systems Service (CRB Chairman) is responsible for:

- Leading CRB meetings (or delegating this responsibility to another CRB member).
- Making final decisions regarding approval or disapproval of Class I CRs and of Project EASI/ED Class II CRs.
- Reviewing the results of Project EASI/ED configuration audits.
- Reviewing appeals to the CRB regarding previous decisions on specific CRs.

The Project EASI/ED project manager is responsible for:

- Participating in the CRB as the senior ED representative of Project EASI/ED and all of its subprojects.
- Providing specific functional, management, and/or technical insight in discussions regarding Project EASI/ED CRs and regarding the potential impact of Title IV system CRs on Project EASI/ED.

The Project EASI/ED integration manager is responsible for:

- Providing detailed technical insight and overall management insight into the potential impact of Project EASI/ED subproject CRs and of Title IV system CRs on Project EASI/ED as a whole.
- Explaining specific aspects of Project EASI/ED Class I CRs.
- Facilitating the CRB meetings at the CRB chair's request.

The Project EASI/ED configuration manager is responsible for:

- Providing insight into Project EASI/ED CM practices and procedures as they relate to information presented to the CRB.
- Providing insight into the status of CMA activities as they pertain to the CRB.
- Presenting CM audit results to the CRB, and responding to CRB questions regarding these results.

Title IV systems project managers or configuration managers may be appointed as permanent members of the CRB or may be requested to attend only those meetings in which their respective systems are clearly involved. Title IV managers participating in the CRB are responsible for:

- Providing specific technical and management insight into the Class I CRs for their respective systems.
- Providing specific technical and management insight into the impact of Class I CRs from other Title IV systems, Project EASI/ED, or Project EASI/ED subprojects.
- Presenting appeals to previous CRB decisions regarding Class I CRs for their respective systems.

The scribe is a member of the CMA, and is responsible for:

- Taking notes and documenting the results of the CRB meetings in formal minutes.
- Ensuring that the approved notes are distributed promptly to all involved system and subproject managers.

The procedure for conducting the CRB meeting is described in detail in Appendix C.

3. CONFIGURATION IDENTIFICATION

Configuration identification involves classifying a system's structure, uniquely identifying individual system components (CIs), and documenting the components' functional and physical characteristics. The goals of configuration identification are to identify a system's components throughout the life cycle and to provide traceability between the system and related system products. Configuration identification includes:

- Selection of CIs.
- Establishment of a baseline for system CIs.
- Issuance of numbers and other identifiers affixed to the CIs.

Subsection 3.1 describes the procedure for selecting CIs. Subsection 3.2 introduces the concept of a baseline and describes when CIs will be baselined. Subsection 3.3 describes the numbering schema used for identifying CIs. Subsection 3.4 describes procedures for selection CIs.

3.1 Project EASI/ED CI Categories

A CI is any item that project or subproject management wants to place under configuration control. Project EASI/ED CIs will be classified into three primary categories: documentation, software, and hardware. Subsection 3.1.1 describes documentation, Subsection 3.1.2 describes software, and Subsection 3.1.3 describes hardware.

3.1.1 Documentation

Project EASI/ED documentation is defined as all documentation that is produced as part of Project EASI/ED or its subprojects during any stage of the life cycle, and that is identified as a deliverable end product. Each document that meets this definition will be assigned a unique CI number.

Each document associated with Project EASI/ED application software will be assigned its own unique CI number independent of the application software it supports. The CI numbers of these documents will be cross-referenced with the application software CI when the application software is itself initially baselined and assigned a CI number in the CM tool. For example, when a subproject wants to initially baseline their application software they will be required to load it into the CM tool. One piece of CI information that will be required will be the CI numbers of related documents such as application requirements or design specification documents.

All documentation that accompanies purchased software (e.g., user and installation guides) will be considered part of the software. The software will be assigned a CI number and each accompanying document will be assigned a CI number using the same CI item number as was assigned to the software and using a unique CI component number. Section 3.4 explains the configuration identification schema and definitions for the CI item number and CI component number within a configuration identifier.

3.1.2 Software

All system and application software used by or developed as part of Project EASI/ED will be placed under configuration management. System and application software includes:

- Operating systems.
- COTS packages.
- Application subsystems.
- Application programs.
- Job control statements.
- Communication software.
- Enterprise databases.
- Utilities, scripts, or database triggers.

3.1.3 Hardware

Project EASI/ED hardware subject to configuration control will include:

- Hardware and telecommunications resources, either dedicated or shared, used by Project EASI/ED that have been integrated with a design, development, test, demonstration, and/or production environment.
- Hardware and telecommunications resources, either dedicated or shared, used to support a Project EASI/ED design, development, test, demonstration, and/or production environment and whose operation and maintenance are directly under the control of Project EASI/ED.

3.2 Baseline Establishment

A “baseline” identifies an agreed-upon description of a system at a discrete point in time and provides a known configuration from which changes are addressed. Baselines provide the foundation for change control for individual CIs, for subproject baselined CIs, and for system CIs. Baselines are established to:

- Distinguish among different system CI releases and versions.
- Help ensure complete and up-to-date technical product documentation.
- Enforce QA standards.
- Serve as a means of promoting CIs and their components from one phase of the Project EASI/ED life cycle to the next.

This section describes three levels of baseline establishment:

1. The initial loading of individual Project EASI/ED and Project EASI/ED subproject CIs into the CM tool.
2. Project EASI/ED subproject baselines, which include all CIs constituting the subproject at the time the baseline is cut.
3. Project EASI/ED system baselines that include all production CIs among all Project EASI/ED subprojects.

3.2.1 Individual Configuration Item Baseline Establishment

Individual CIs will be established at the Project EASI/ED level and at Project EASI/ED subproject levels. An individual CI is considered to be baselined when the required information about that CI is successfully loaded into the CM tool, accompanying electronic media and/or hard copy documentation are checked into the CM tool or library respectively, and a CI number is assigned. An initial baseline should be established for each of the individual CI categories at the times specified below.

- **Documentation** - An initial baseline will be established for Project EASI/ED documentation at the time of final delivery. If a document is developed in sections, each section that is clearly identified as complete through formal review and/or delivery will be baselined, and any subsequent changes to a baselined section will be handled according to the change control processes outlined in Section 4 of this *CM Plan*.
- **Hardware and System Software** - An initial baseline will be established for Project EASI/ED hardware and system software when the hardware or software becomes operational and is integrated into a Project EASI/ED development, testing, demonstration, and/or production environment.
- **Application Software** - Project EASI/ED application software will be initially baselined prior to the beginning of unit testing.

Figure 3-1 shows each of the CI categories and their initial baseline milestones.

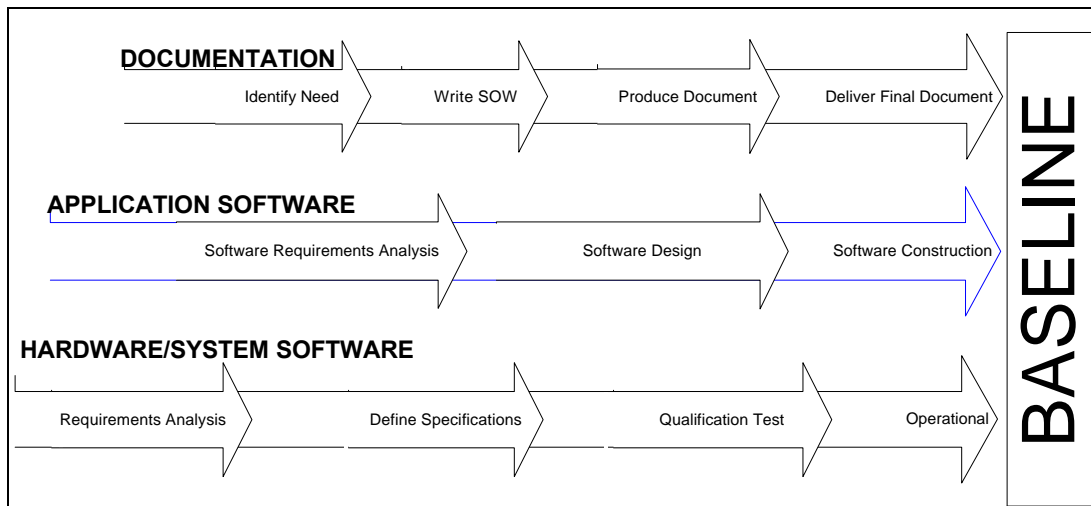


Figure 3-1. Initial Baseline Milestones for CIs.

3.2.2 Project EASI/ED Subproject Baseline Establishment

A subproject baseline is a snapshot of the total set of subproject CIs at a specified point in the life cycle. Project EASI/ED subprojects are required to create subproject baselines at specified points throughout the life cycle. These points are shown in Figure 3-2, and are briefly described below.

1. **Concept baseline** is established at the end of the concept phase to document the system's high-level requirements.

2. **Functional baseline** is established at the end of the definition phase to facilitate the multiple, parallel implementation approach. The functional baseline established at the end of the definition phase will initially allocate subsystem and data across a proposed architecture.
3. **Allocated baseline** is established at the end of the design phase to document the allocation of functional requirements to specific software systems or subsystems and to document the specific documentation, hardware, system software, and communications configuration items comprising the technical architecture.
4. **Test baseline** is established at the end of the unit test phase to document the version of documentation, software and hardware submitted for system testing.
5. **Product baseline** is established at the end of the system test phase to document the implementation version of the system being delivered for user acceptance testing.
6. **Production baseline** is established at the end of system implementation, prior to operation, to document the production release and version of the system.

As outlined in Subsection 2.1.2 of the *Project EASI/ED Program Management Plan (December 1996)*, a number of reviews are required at different points in the Project EASI/ED development life cycle. Several of these reviews coincide with Project EASI/ED subproject baseline points. Successful completion of these reviews is a prerequisite for establishing the corresponding baseline. These reviews are shown in Figure 3-2, and are briefly described below.

1. **System Requirements Reviews (SRRs)** will be conducted at the end of the definition phase to resolve open issues regarding specified software system or subsystem requirements. This review is to ensure client's concurrence with system requirements. After successful completion and evaluation of this review, the CMA and the subproject CM manager(s) will ensure proper control of the CIs and will establish the functional baseline.
2. **Preliminary Design Reviews (PDRs)** will be conducted during the design phase, after the completion of high-level specifications and draft test plans, to resolve open issues regarding system- or subsystem-wide design decisions. This review ensures that the preliminary design is correct and consistent with the defined requirements identified in the *Project EASI/ED BARD* (July 1997). After successful completion of this review, the CMA and the subproject CM manager(s) will ensure proper control of the CIs.
3. **Critical Design Reviews (CDRs)** will be conducted at the end of the design phase, prior to entering construction and after the completion of detailed specifications, to resolve open issues regarding design of specific computer software CIs. This review ensures that the detailed design is correct and consistent with the defined requirements identified in the *Project EASI/ED BARD*. After successful completion of this review, the CMA and the subproject CM manager(s) will ensure proper control of the CIs and will establish the allocated baseline.
4. **Test Readiness Reviews (TRRs)** will be conducted near the end of the unit test phase, prior to entering system test, to resolve issues regarding the software test environment, test cases and test procedures for system testing, or the status of the system being tested. This review is to ensure that the software is ready for system testing. After successful completion of this review, the CMA and the subproject CM manager(s) will ensure proper control of the CIs and will establish the test baseline.

5. **Software Usability Reviews (SURs)** will be conducted during the implementation phase, after user acceptance testing, to resolve issues regarding the system's readiness for installation at user sites, supporting user and operator documentation, system documentation, or the status of installation preparation. After successful completion of this review, the CMA and the subproject CM manager(s) will ensure proper control of the CIs and will establish the production baseline.

Figure 3-2 below, shows the review and baseline points, discussed above, applied to the life cycle stages.

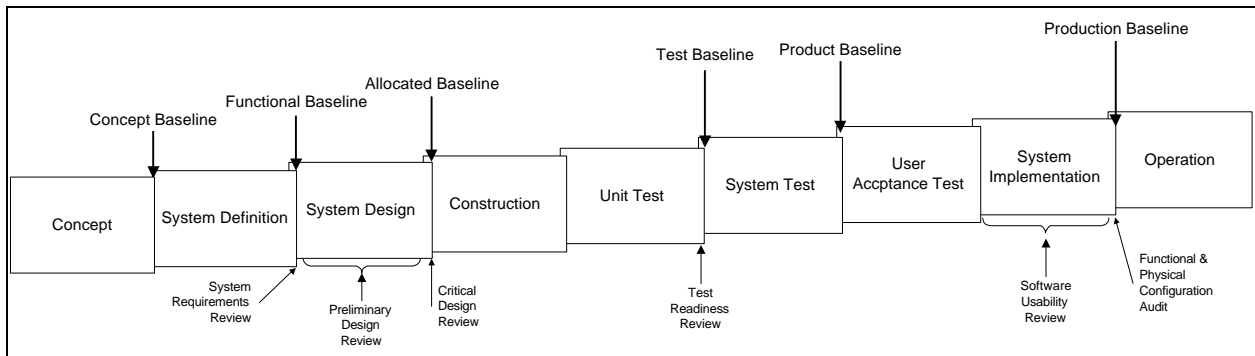


Figure 3-2. Project EASI/ED Life Cycle Reviews and Baselines.

In addition to the reviews identified above, an FCA and a PCA must be successfully completed prior to the establishment of a production baseline. These audits are described in detail in Section 6 of this *CM Plan*. Upon successful completion of these audits, the Project EASI/ED project manager, working with the Project EASI/ED integration manager and the involved subproject manager, will review the audit results and will determine whether the production baseline should be established.

All Project EASI/ED subprojects will include these reviews and baselines in their individual CM plans.

When a subproject baseline is first created for each subproject, a new, summary-level CI will be created so that all related CIs within the subproject can be associated, creating the baseline snapshot of the subproject at that time. The initial subproject baseline will be created with its own CI number. Subsequent subproject baselines will show a version change in the subproject baseline CI number.

3.2.3 Project EASI/ED System Baseline Establishment

A Project EASI/ED system baseline is a snapshot of the CIs constituting the production version of the Project EASI/ED system at a particular point in time. This baseline will comprise the CIs within the production baselines of each of the Project EASI/ED subprojects. The CMA will be responsible for establishing system level baselines throughout the Project EASI/ED life cycle. System-level baselines will be established, at a minimum, as each subproject successfully establishes a production baseline. A system baseline may also be established at any other point at the discretion of the Project EASI/ED project manager and/or the Project EASI/ED integration manager .

When the Project EASI/ED system baseline is first created, a new, summary-level CI will be created so that all related CIs within the system baseline can be associated, creating the baseline snapshot of the Project EASI/ED system at that time. The initial Project EASI/ED system baseline will be created with its own CI number. Subsequent Project EASI/ED system baselines will show a version change in the Project EASI/ED system baseline CI number.

3.3 Configuration Item Identification Schema

This section describes the configuration item identification schema that will be used by Project EASI/ED and Project EASI/ED subprojects to uniquely identify CIs.

The configuration item identification schema for Project EASI/ED subprojects will be applied and controlled through the Project EASI/ED CM tool. Project EASI/ED subprojects will be expected to ensure compliance with this schema through the processes and procedures documented in their subproject CM Plans.

Figure 3-3 specifies the schema for assigning unique identifiers to each item to be controlled during the Project EASI/ED life cycle.

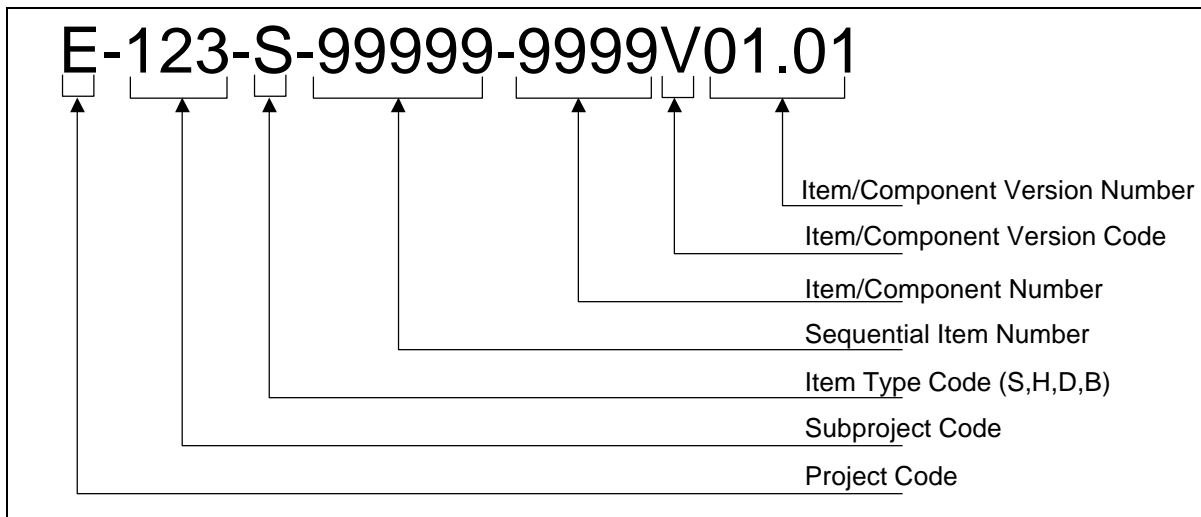


Figure 3-3. Project EASI/ED CI Identification Schema.

The components of the CI identification schema identified in Figure 3-3 are defined below:

Project Code	The project code for Project EASI/ED is "E". This code will be part of all CIs for Project EASI/ED.
System/Subproject Code	The system/subproject code will uniquely identify whether the CI number belongs to Project EASI/ED or to a Project EASI/ED subproject. System/ subproject code will be assigned by the CMA.
Item Type Code	All CI numbers will contain an item type code of "S" for software, "H" for hardware, "D" for documentation, or "B" for system or subproject baseline.
Item Number	A unique sequential number will be assigned to each CI. This number will be automatically generated and assigned to the CI by the CM tool. This number will be five digits in length and will be padded with zeros. For example, a CI entered into the CM tool could be assigned "00143." The item number will be an independent, sequentially generated number for each of the item type codes.
Component Number	If a CI consists of multiple components, each component CI number will be assigned the item number of the parent CI, and a unique component number. The component number will be four digits in length and will be padded with zeros. The component number will be a sequentially generated number.
Item/Component Version Code	All CI numbers will have a "V" at this position in the CI number.
Item/Component Version Number	Each documentation, hardware, or software CI and CI component will be assigned a version number. The version number will have two positions to the left of the decimal and two positions to the right of the decimal. The two positions to the left of the decimal will indicate releases. The two positions to the right of the decimal will indicate version changes to a release.

3.4 Configuration Item Selection Procedures

This section details four CM procedures for selecting CIs within Project EASI/ED. The four CI selection procedures are:

- Selection of individual CIs at the Project EASI/ED level.
- Selection of individual CIs for Project EASI/ED subprojects.
- Selection of Project EASI/ED subproject baseline CIs.
- Selection of system baseline CIs.

3.4.1 Project EASI/ED Individual Configuration Item Selection Procedures

Figure 3-4 illustrates the procedure for the initial individual CI selection for Project EASI/ED.

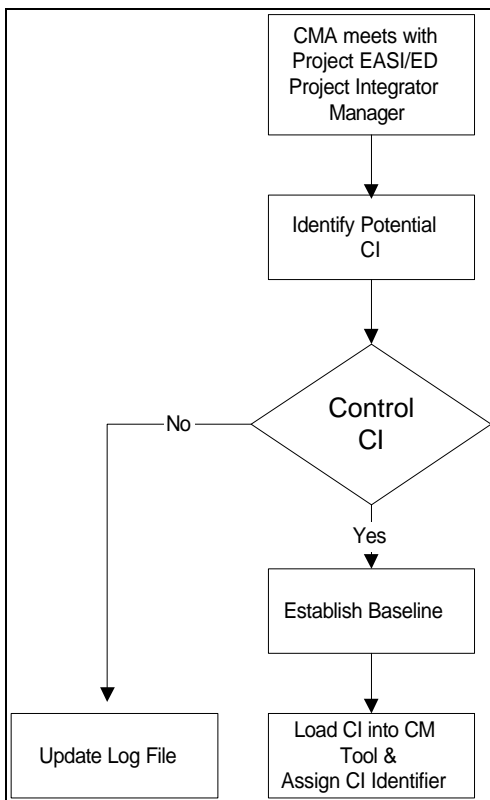


Figure 3-4. Project EASI/ED Initial CI Selection Process.

The following steps detail the CM procedure for initial individual CI selection illustrated in Figure 3-4.

- Step 1.** The CMA Configuration Manager will coordinate a meeting with the Project EASI/ED project integrator manager within 20 days of task initiation.
- Step 2.** The Project EASI/ED project integrator manager provides the CMA CM manager a task work plan and deliverable schedule as soon as they are available.
- Step 3.** At the meeting, the CMA Configuration Manager and Project EASI/ED project integrator manager will review the task deliverables and supporting products for potential CIs.
- Step 4.** This group decides which items or classes of items will be placed under configuration control.
- Step 5.** As each identified CI reaches its first required baseline, the CMA CM manager coordinates with the CMA to have the CI's information loaded into the CM tool.
- Step 6.** Based on the information provided about the CI, the CM tool automatically assigns a CI identifier to the item.

In the event that an item is identified, after the initial CI selection review described above, as a potential CI, the following steps will be applied:

- Step 1.** An individual on Project EASI/ED identifies an item as a potential CI.
- Step 2.** The Project EASI/ED project integrator manager and CMA CM manager review the item and make a decision whether it should be a CI.
- Step 3.** When the CI reaches its first required baseline, the CMA CM manager will coordinate with the CMA to have the CI's information loaded into the CMA CM tool.
- Step 4.** Based on the information provided about the CI, the CM tool automatically assigns a CI identifier to the item.

3.4.2 Subproject Individual Configuration Item Selection Procedures

Figure 3-5 illustrates the procedure for initial CI selection at the subproject level of Project EASI/ED.

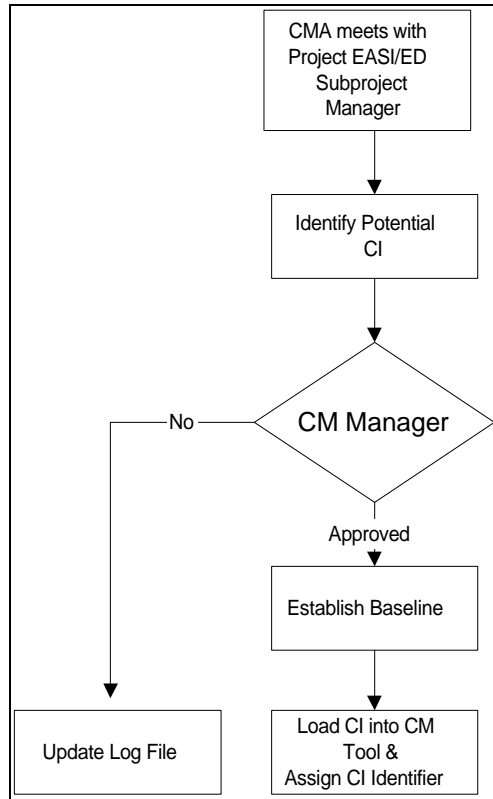


Figure 3-5. Project EASI/ED Subproject Initial CI Selection Process.

The following steps detail the procedure for initial CI selection, as illustrated in Figure 3-5.

Step 1. The Project EASI/ED configuration manager will coordinate a meeting with the Project EASI/ED subproject configuration manager within 20 days of subproject initiation.

Step 2. The Project EASI/ED subproject manager will provide the Project EASI/ED configuration manager a subproject work plan and deliverable schedule as soon as they are available.

Step 3. At the meeting, the Project EASI/ED configuration manager and the subproject CM manager will review the task deliverables and supporting products for potential CIs.

Step 4. This group decides which items or classes of items will be placed under configuration control.

Step 5. As each CI reaches its required baseline point, the Project EASI/ED subproject configuration manager (or staff) will load the CI information into the CM tool.

Step 6. Based on the information provided about the CI, the CM tool automatically assigns a CI identifier to the item.

In the event that an item is identified as a potential CI after the initial CI selection review described above, the following steps will apply:

- Step 1.** An individual on a Project EASI/ED subproject identifies an item as a potential CI.
- Step 2.** The Project EASI/ED subproject configuration manager will review the item and determine whether it should be a CI.
- Step 3.** When the CI reaches its first required baseline, the Project EASI/ED subproject configuration manager (or staff) will load the CI information into the CM tool.
- Step 4.** Based on the information provided about the CI, the CM tool automatically will assign a CI identifier to the item.

3.4.3 Subproject Baseline Configuration Item Selection Procedure

The following steps detail the procedure for initial subproject baseline CI selection.

- Step 1.** At the point that a subproject baseline is to be created, the Project EASI/ED subproject configuration manager will coordinate with the subproject project manager to obtain a listing of the CI numbers that comprise the baseline.
- Step 2.** The Project EASI/ED subproject configuration manager will coordinate the creation of a subproject baseline CI and will ensure that the subproject baseline CI information is loaded into the CM tool.

3.4.4 System Baseline Configuration Item Selection Procedure

The following steps detail the procedure for initial system CI selection required when a subproject successfully establishes a Production Baseline.

- Step 1.** After successful creation of the subproject production baseline, the Project EASI/ED configuration manager will coordinate with the subproject configuration manager to obtain a listing of the CI numbers that comprise the production release.
- Step 2.** The Project EASI/ED configuration manager will identify all Project EASI/ED CIs that need to be included in this system baseline.
- Step 3.** The Project EASI/ED configuration manager will coordinate the creation of a system CI that includes the CIs from the subprojects and integration-level CIs.

The procedure for establishing a system baseline CI at any other baseline point will be the same as the above procedure.

3.5 Configuration Item Key Characteristics

Project EASI/ED and its subprojects will be expected to enter all information related to their CIs directly into the CM tool. The following is the minimum set of information that will be provided when a CI is loaded into the Project EASI/ED CM tool:

Submission Date	Date the CI information is entered into the CM tool..
Submitted By	Name of the person entering the CI information into the CM tool.
System/Subsystem Code	Name of the Project EASI/ED subproject submitting the CI.
Review or Baseline	The review or baseline the CI has reached.
Life Cycle Status	What stage of the life cycle is the CI.
Manager Name	Name of the manager of the subproject submitting the CI.
Point Of Contact	Point of contact for the CI.
CI Number	CI identifier.
Item Name	CI name.
Item Description	CI description.
Related CIs	Other CIs associated with this CI.
Components	Parts of this CI that are delivered with this CI.
Comments	Other comments added to further describe the CI.
Version	Version number associated with the CI.
Number Of Licenses	If CI type system/packaged software, number of licenses issued.
Existing Title IV CI Number	Existing Title IV CI Number.
Title IV Aid System Name	Title IV System Name Abbreviation.
Title IV Point Of Contact	Point of Contact for CI.
Title IV Description	Title IV Description of CI.

4. CONFIGURATION CONTROL

Configuration control is the process by which changes to system components are managed. Configuration control begins after CIs are formally identified and refers to the evaluation, coordination, approval or disapproval, and implementation of changes to those CIs. The goal of configuration control is to establish mechanisms that will help ensure the production and maintenance of quality system components.

Configuration control activities include:

- Establishing change control processes and procedures.
- Tracking and documenting changes.
- Processing system component changes.

Subsection 4.1 describes the classes of change requests that fall under Project EASI/ED CM. Subsection 4.2 describes the numbering schema that will be used to identify Project EASI/ED Change Requests (CRs). Subsection 4.3 describes the process to be used to control Project EASI/ED and Title IV system CRs. Subsection 4.4 describes the automated tool that will be used for Project EASI/ED CM.

4.1 Change Request Classification

A CR is a formal request by an individual to change a CI within Project EASI/ED. A CR may involve changes to individual hardware, software, or documentation CIs, or it could require changes to multiple CIs in combination. Also, CRs may be very limited in impact (such as changing the length of a text field on a screen), or may have a large impact system-wide (such as a request to add a new type of disbursement functionality to Project EASI/ED). To assist in the control of changes, Project EASI/ED CRs will be classified into two distinct types: Class I and Class II. These CR classifications are described in subsections 4.1.1 and 4.1.2.

4.1.1 Class I Change Requests

Class I CRs are those that may have an impact beyond the scope of the organization that is proposing them. A proposed change to a CI will be classified as Class I if:

- The change would have a significant impact on the functionality of Project EASI/ED as a whole, a Project EASI/ED subproject, or a current Title IV system.
- The change is likely to impact other Project EASI/ED subprojects or Title IV systems in any way, even if the magnitude of the change itself is not great enough to qualify it as a Class I CR.

Examples of Class I CRs include:

- The addition of new functionality, such as a new type of disbursement method.
- The addition of an entity type to the Project EASI/ED enterprise-wide database.
- Modifications to the specification of an interface file used by another Project EASI/ED subproject or by a current Title IV system.
- A change in the business rules used to create data used by other subprojects.
- A change in operating system version on a hardware platform shared by other subprojects.

4.1.2 Class II Change Requests

All CRs that do not meet the requirements to be classified as Class I CRs are identified as Class II CRs. Generally, Class II CRs are those that are of limited scope, causing a relatively small amount of change to a particular subproject or Title IV system, and have no impact outside that subproject or system and do not represent significant investments of resources (time, staff, funds).

Examples of Class II changes include:

- Minor changes that do not affect the functionality or operations of other systems or subsystems.
- Changes to correct editorial errors.
- Additions to clarifying notes or diagrams.
- Changes to hardware that do not affect any Class I factor listed above.
- Other changes of minor nature.

4.2 Change Request Identification Schema

All Project EASI/ED CRs will be assigned a unique identification number and will be tracked throughout their lives using that number. CRs will be maintained within the CM tool, and CR numbers will be assigned automatically by the CM tool when the CR is created. CR numbers will follow the identification schema shown in Figure 4-1 below.

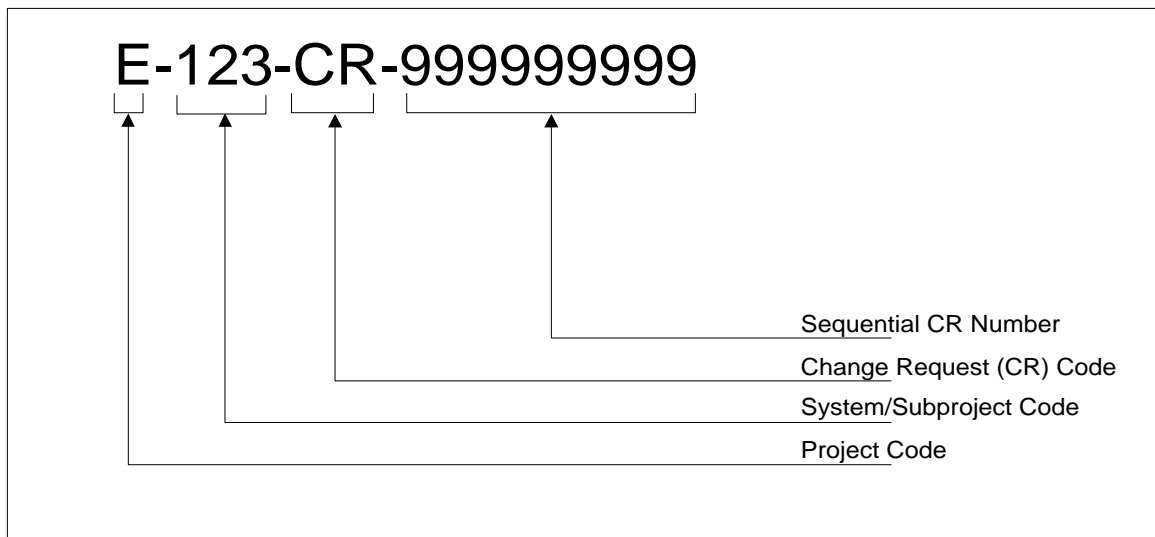


Figure 4-1. Project EASI/ED Change Request Identification Schema.

The components of the CR identification schema presented in Figure 4-1 are defined below.

Project Code	The project code for Project EASI/ED is "E." This code will be part of all CRs for Project EASI/ED.
System/Subproject Code	The system/subproject code will uniquely identify the Project EASI/ED system level, each Project EASI/ED subproject and each Title IV system. The system/subproject codes will be assigned by the CMA.
Change Request Code	All CR numbers will have a "CR" at this position in the CR number.
CR Sequence Number	A unique sequential number will be assigned to each CR. This number will be automatically generated and assigned to the CR by the CM tool. This number will be nine digits in length and will be padded with zeros. For example, a CR entered into the CM tool could be assigned "000000143."

4.3 Change Processing

CRs within the scope of Project EASI/ED CM may be initiated in a number of different ways. Within Project EASI/ED, CRs may be initiated within Project EASI/ED subprojects or at the Project EASI/ED integration or system level. External to Project EASI/ED, current ED Title IV systems can originate CRs that must be reviewed for potential impact on Project EASI/ED and/or Title IV systems. Figure 4-2 below shows the overall CR process for Project EASI/ED.

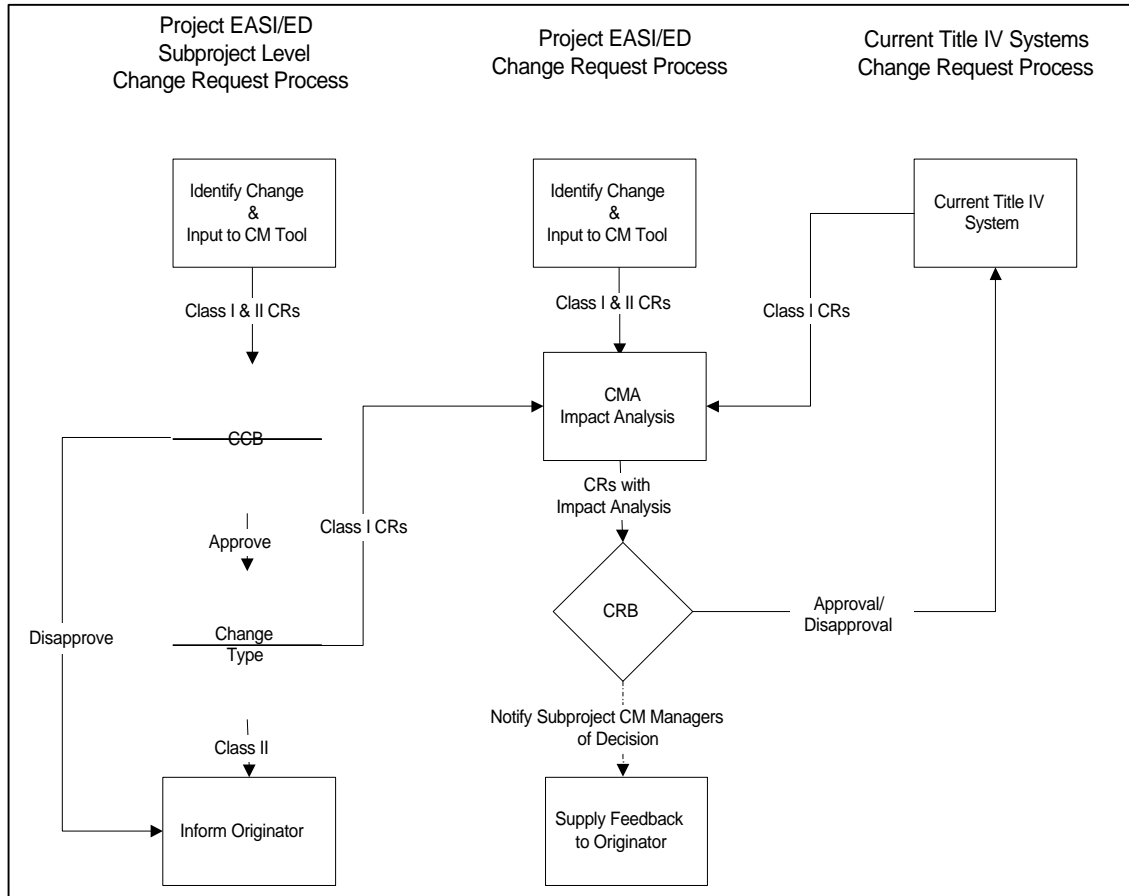


Figure 4-2. Project EASI/ED Change Control Process.

The CR process shown above is intended to control four types of changes:

- CRs from Project EASI/ED subprojects that impact Project EASI/ED at the system level.
- CRs from ED's current Title IV systems that impact Project EASI/ED.
- CRs from Project EASI/ED that impact Title IV systems.
- CRs from ED's current Title IV systems that impact other Title IV systems.

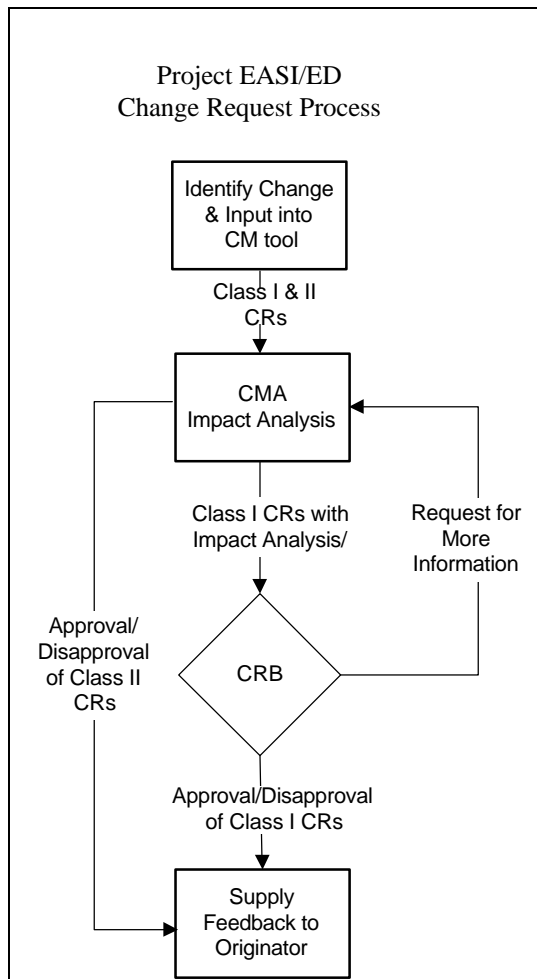
The CRB is responsible for approving or disapproving all Class I CRs across both the current Title IV systems and Project EASI/ED. Class II CRs are processed by the subproject or Title IV system CCBs, or by the CMA in the case of Project EASI/ED. The CMA will provide administrative support to the CRB, and is responsible for coordinating the analysis of all Class I CRs to determine their impact, if any, on Project EASI/ED and/or other Title IV systems.

The remainder of Section 4.3 of the *Project EASI/ED CM Plan* describes in detail how different types of CRs are processed. Subsection 4.3.1 describes how Project EASI/ED system-level CRs are processed.

Subsection 4.3.2 describes how CRs from Project EASI/ED subprojects are processed. Subsection 4.3.3 describes how CRs from ED's current Title IV system are processed. Both subsections 4.3.1 and 4.3.2 address the issue of Project EASI/ED CRs impacting current Title IV systems.

4.3.1 Project EASI/ED CR Processing

CRs initiated at the Project EASI/ED system level will be those affecting Project EASI/ED-wide products (e.g., *Project EASI/ED Business Area Requirements Document*, *Project EASI/ED Common Operating Environment Document*). Both Class I and Class II CRs may be raised at this level. The Project EASI/ED configuration manager (as the leader of the CMA group) will be responsible for approving or disapproving Class II changes. Class I changes will be analyzed and forwarded to the CRB for review. Figure 4-3 below outlines the process flow for Project EASI/ED CRs.



The following steps describe the sequence of actions that take place to process a Project EASI/ED CR.

Step 1. Individual identifies a change to a Project EASI/ED CI. Individual classifies the change as either Class I or Class II, and generates a CR by inputting the change request into the CM tool.

Step 2. The CM tool checks for completeness of information and assigns a CR identifier.

Step 3. The tool, via e-mail, notifies the Project EASI/ED configuration manager that a new CR has been created.

Step 4. The Project EASI/ED configuration manager reviews the CR and checks for the accuracy of information of the CR.

Step 5. If the CR is Class II the CMA Manager, after appropriate consultation with other Project EASI/ED managers, will render a decision on the CR.

Step 1. Once the CMA Manager has rendered a decision on a Class II CR, the CMA Manager will update the status of the CR in the CM Tool to approved or disapproved as appropriate, and inform the originator and all other involved parties of the CR of the decision.

Figure 4-3. Project EASI/ED CR Process.

- Step 2.** The CMA will perform an impact analysis on every Class I CR. This will be accomplished by:
- Researching the CM database for related CRs.
 - Interviewing individuals who are directly associated with the change.
 - Providing a copy of the CR to the configuration managers of each Project EASI/ED subproject and of each current Title IV system, and requesting that they assess whether or not the CR, if implemented, would have an impact in their systems. Replies will be required within 14 calendar days of receipt.
- Step 8.** The CMA will synthesize the responses received for the CR and will prepare an impact analysis statement.
- Step 9.** As input to the regular CRB meeting, the CMA will provide the CRB with information on all Class I CRs received since the previous CRB, including any impact analysis reports that are completed. The CRB will also receive, for informational purposes, a summary of any Class II CRs decided upon by the Project EASI/ED configuration manager.
- Step 10.** The CRB will review the CRs and the impact analysis statements and will make decisions on all Class I CRs.
- Step 11.** The CRB will return the CR to the CMA if the impact analysis is incomplete or if more information is needed to make a decision on the CR. If an impact analysis on a CR has yet to be completed, and if the CRB decides that the change requested is of sufficiently high priority that processing on the CR must be completed as soon as possible, then the CRB may authorize the CMA to notify all outstanding subprojects and Title IV systems managers that they must complete their impact assessment within 5 working days.
- Step 12.** The CMA will record the results of the CRB meeting, and will facilitate notification of all Project EASI/ED subproject and Title IV system configuration managers of the decision made on each CR.
- Step 13.** If a Class I Project EASI/ED CR is approved, the CR originator may check out the affected CI from the CM tool and make the requested change.
- Step 14.** Once a change is complete, the CR originator will check the changed CI into the CM tool and will update the CR's status to "complete."

4.3.2 Project EASI/ED Subproject CR Processing

CRs initiated at the Project EASI/ED subproject level will be those affecting the CIs that belong to particular subprojects, such as detailed design documents and application software modules. Both Class I and Class II CRs may be raised at this level. The subproject CCB will be fully responsible for approving or disapproving Class II changes. Class I changes the subproject CCB approves will be forwarded to the CRB for review. Figure 4-4 below outlines the process flow for CRs originating from Project EASI/ED subprojects.

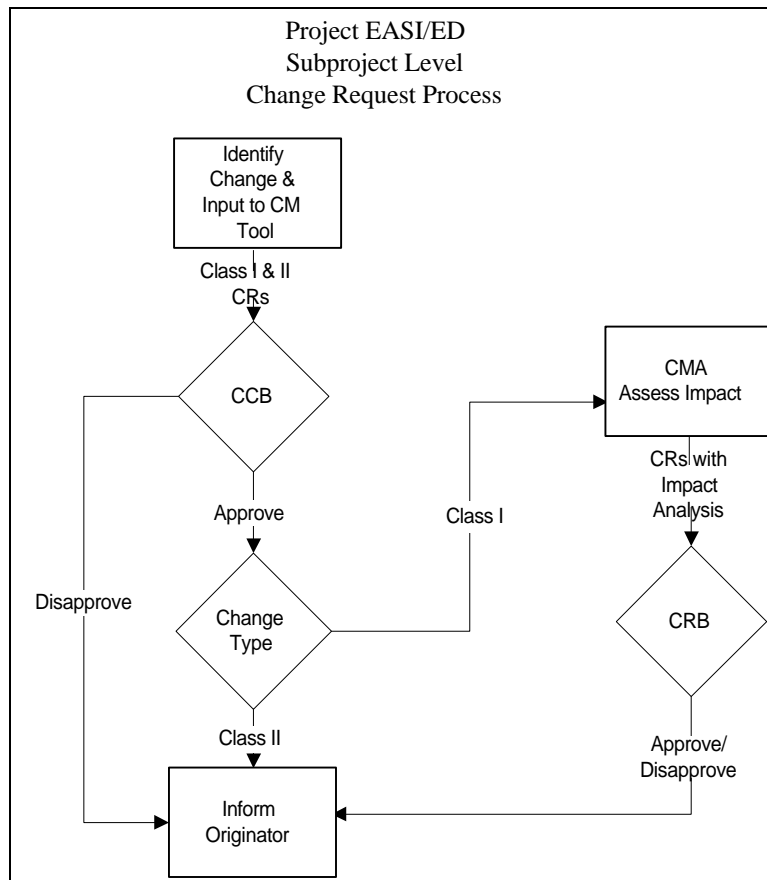


Figure 4-4. Project EASI/ED Subproject Change Process.

The following steps describe the sequence of actions that take place to process a CR from a Project EASI/ED subproject.

- Step 1.** Individual identifies a change to a CI. Individual classifies the change as either Class I or Class II. Individual generates a CR by inputting the change into the CM tool.
- Step 2.** The CM tool checks for completeness of information and assigns a CR identifier.
- Step 3.** The tool, via e-mail, notifies the subproject configuration manager that a new CR has been created.
- Step 4.** The subproject configuration manager reviews the CR and checks for the accuracy of CR information. If the CR is completely and accurately filled out, it will be forwarded to the CCB. If not, it will be returned to the originator for correction.

- Step 5.** The subproject CCB, after consultation with appropriate subproject managers, will render a decision on the CR.
- Step 6.** Once a decision has been made on a Class II CR by the subproject CCB, the configuration manager will update the CR status (i.e., approved or disapproved) in the CM tool and will notify the individual originating the CR and all other involved parties of the decision.
- Step 7.** All Class I CRs approved by the subproject CCB will be forwarded to the CMA.
- Step 8.** The CMA will perform an impact analysis on every Class I CR. This will be accomplished by:
- Researching the CM database for related CRs.
 - Interviewing individuals directly associated with the change.
 - Providing a copy of the CR to the configuration managers of all other Project EASI/ED subprojects and of each current Title IV system, and requesting that they assess whether or not the CR, if implemented, would impact their systems. Replies will be required within 14 calendar days of receipt.
 - The Project EASI/ED configuration manager will coordinate an assessment by the Project EASI/ED integrator of the impact of the CR on Project EASI/ED integration activities.
- Step 9.** The CMA will synthesize the responses received for the CR and will prepare an impact analysis statement.
- Step 10.** As input to the regular CRB meeting, the CMA will provide the CRB with information on all Class I CRs received from Project EASI/ED subprojects since the previous CRB, including any impact analysis reports that are completed.
- Step 11.** The CRB will review the CRs and the impact analysis statements and will make a decision on all Class I CRs.
- Step 12.** The CRB will return the CR to the CMA if the analysis is incomplete or if more information is needed to make a decision. If an impact analysis on a CR has yet to be completed because replies were not received from all subprojects or current Title IV systems, and if the CRB decides that the change is of high enough priority that processing on the CR must be completed as soon as possible, then the CRB may authorize the CMA to notify all outstanding subprojects and Title IV system managers that they must complete their impact assessment within 5 working days.
- Step 13.** The CMA will record the results of the CRB and will facilitate notification of all Project EASI/ED subproject and current Title IV system configuration managers of the decision made on each CR.
- Step 14.** If the CR is approved, the CR originator may check out the affected CI from the CM tool and make the change.
- Step 15.** Once the change is complete, the CR originator will check the changed CI into the CM tool and update the status of the CR to completed.

4.3.3 Current Title IV System Change Request Processing

CCBs for the current Title IV systems are fully responsible for the approval or disapproval of Class II changes. However, approved Class I changes will be passed on to the CRB to assess what impact, if any, they may have on Project EASI/ED or other Title IV systems. Figure 4-5 below outlines the process flow for CRs originating from current Title IV systems.

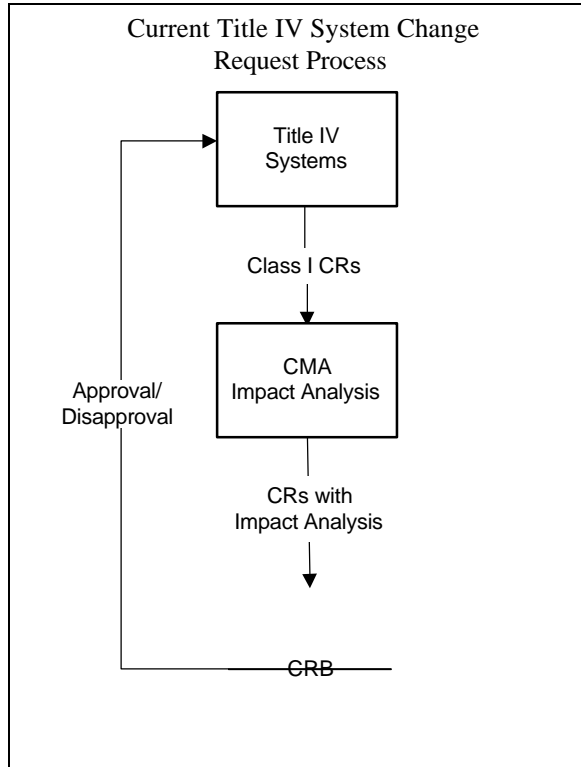


Figure 4-5. Current Title IV System Change Request Process.

The following steps describe the sequence of actions that take place to process a Class I CR from a current Title IV system, once that system's CCB has approved the request (and before any implementation action is taken on the CR).

Step 1. All Title IV system Class I CRs will be sent to the CMA.

Step 2. The CMA will perform an impact analysis on every Class I CR. This will be accomplished by:

- Researching the CM database for related CRs.
- Interviewing individuals that might be directly associated with the change.
- Providing a copy of the CR to the configuration managers of all Project EASI/ED subprojects and other Title IV systems and requesting that they assess whether or not the CR, if implemented, would impact their subproject or system.. Replies will be required within 14 calendar days of receipt.
- The Project EASI/ED configuration manager will coordinate an assessment by the Project EASI/ED integrator of the impact of the CR on Project EASI/ED integration activities.

Step 3. The CMA will synthesize the responses received for the CR and will prepare an impact analysis statement.

Step 4. As input to the regular CRB meeting, the CMA will provide the CRB with information on all Class I CRs received from ED's current Title IV systems since the previous CRB, including any impact analysis reports that are completed.

Step 5. The CRB will review the CRs and their impact analysis reports and will make decisions on all Class I CRs.

Step 6. The CRB will return the CR to the CMA if the analysis is incomplete or if more information is needed to make a decision on the CR. If an impact analysis on a CR has yet to be completed because replies were not received from all subprojects and Title IV systems, and if the CRB decides that the change is of high enough priority that processing on the CR must be completed as soon as possible, then the CRB may authorize the CMA to notify all subproject and Title IV CM managers that they must complete their impact assessment within 5 working days.

Step 7. The CMA will record the results of the CRB and will facilitate notification of all Project EASI/ED subproject and current Title IV system configuration managers of the decision made on each CR.

4.3.4 Emergency Change Procedures

Emergency changes are defined as maintenance-only changes to production software or hardware to correct operational problems that hinder normal business activity. Emergency changes must be closely scrutinized to ensure that they remain the exception rather than the rule. For Project EASI/ED, an emergency change request must be communicated to the Project EASI/ED operations manager, who will decide whether the change is to be allowed. If approved, the change must be confirmed by written message within 24 hours and must be followed by a formal CR within 3 days after the first communication, unless otherwise specified by the CMA.

Emergency changes may be approved for the following reasons:

- Emergency Hardware Changes *Server failure, telecommunication lines failure or any other modification required to make the system meet daily operational requirements.*
- Emergency Software Changes *Changes to production code necessary because of sudden changes in business processes/procedures or software bugs resulting in significant defects in application software functionality.*

4.3.5 Version Control

To track the changes that occur to a CI over its lifetime, different versions of that CI need to be identified and stored. This allows the CI's status at any specified point in time to be maintained and, if necessary, changes can be rolled back to previous versions of the CI. Version control refers to the identification of the points in a CI's life when a new version must be created, and the rules surrounding the assignment of a new version number.

Each time a CI is checked into the CM tool after a change has been made a new version of the CI will be created that gives traceability between the current state of the CI and the state of the CI prior to the change. The version number associated with each CI consists of a release number and a release version. A new release represents a major change to a CI, such as the implementation of a new phase of a subproject. A new release version represents a more minor change, and there may be multiple release versions between each release of a CI.

Project EASI/ED version control will occur at all three levels of CM: individual CI, subproject baseline, and system baseline. The following subsections describe the version control process for each level.

4.3.5.1 Individual CI Version Control

When an individual CI is initially established it will be given version number of "v01.00," where the "01" refers to the release number and the "00" refers to the version within the release (the "release version"). Each time that an individual CI is checked back into the CM tool after a change is made, the tool will verify the CR class associated with the check-in and whether any changes have occurred to the CI since it was checked out.

- If changes were made and the associated CR is a Class I, the release number of the CI will increment by one and the release version will be reset to "00".
- If changes were made and the associated change request is a Class II, the release version will increment by one. If the release version is equal to "99", the release version will be reset to "00" and the release number will increment by one.
- If no changes were made to the individual CI the version number does not change.

Figure 4-6 illustrates how changes in a CI version number may occur over time.

Individual CI History	CI Version Number
Initial Establishment of CI	v01.00
Check-in, Class II, Changes Made	v01.01
Check-in, Class II, Changes Made	v01.02
Check-in, Class II, Changes Made	v01.03
Check-in, Class II, No changes detected	v01.03
Check-in, Class I, Changes Made	v02.00
Many Class II Changes, CI reaches	v02.99
Check-in, Class II, Changes Made	v03.00

Figure 4-6. Individual CI Versioning.

4.3.5.2 Project EASI/ED Subproject Baseline Version Control

Subproject baseline version control is tied to the subproject baselines described in subsection 3.2.2. When a subproject baseline is initially established it will be given version number of “v01.00,” where the “01” refers to the release number and the “00” refers to the version within the release (the “release version”). Because the CM tool requires that the check-in of a CI be accompanied by an approved CR, a CR must be created each time a baseline is to occur. This means that each time the subproject is subsequently baselined (e.g., functional, allocated), a Class II CR will be created by the subproject. Checking the subproject baseline CI into the CM Tool under this CR will cause the release version of the CI to increment by one. Some subprojects may follow a phased approach to implementation, where a subset of the full subproject functionality is implemented and development begins on other subsets. In this case, at the beginning of the new phase of development, a Class I CR will be created by the subproject. Checking the subproject baseline CI into the CM tool under this CR will cause the release number of the baseline to increment by one and the release version to be reset to “00”.

Figure 4-7 illustrates how changes in the subproject baseline CI version number may occur over time.

Subproject Baseline History	CI Version Number
Initial Establishment of Baseline CI at Concept Baseline	v01.00
Check-in, Functional Baseline, Class II, Changes Made	v01.01
Check-in, Allocated Baseline, Class II, Changes Made	v01.02
Check-in, Test Baseline, Class II, Changes Made	v01.03
Check-in, Production Baseline, Class II, Changes Made	v01.05
New Development Phase, Same CI	v02.00

Figure 4-7. Subproject Baseline CI Versioning.

4.3.5.3 Project EASI/ED System Baseline Version Control

Project EASI/ED system baseline version control governs the Project EASI/ED system baselines described in subsection 3.2.3. When a Project EASI/ED system baseline is first established it will be given a version number of “v01.00.” Because the CM tool requires that the check-in of a CI be accompanied by an approved CR, a CR must be created each time a baseline is to occur. This means that each time the Project EASI/ED system is subsequently baselined at the point that a subproject reaches a Production baseline, a Class I CR will be created by the CMA. Checking the Project EASI/ED system baseline into the CM tool under this CR will cause the version number of the CI to increment by one. If at any other point a new Project EASI/ED baseline is created (for example, to implement fixes to production code), then the CMA will create a Class II CR. Checking the Project EASI/ED system baseline into the CM tool under this CR will cause the release version of the CI to increment by one.

Figure 4-8 illustrates how changes in the Project EASI/ED system baseline version number may occur over time.

System Baseline History	CI Version Number
Initial Establishment of System Baseline CI	01.00
Subproject 004 Reaches Production Baseline	02.00
Project EASI/ED Integration Manager Requests Baseline	02.01
Project EASI/ED Integration Manager Requests Baseline	02.02
Subproject 007 Reaches Production Baseline	03.00

Figure 4-8. System Baseline CI Versioning.

4.4 Automated Tools for Configuration Control

Tracking CRs and the CIs to which they relate is an administratively complex process. This is particularly true in the case of Project EASI/ED, where multiple system development or implementation subprojects may be active in parallel and where changes to existing Title IV systems must also be considered. The use of automated tools for CM mitigates much of this complexity and reduces the probability of manual errors and omissions. The recommended CM tool for Project EASI/ED, at least initially, is Platinum Technologies’ CCC/Harvest. ED already has an investment in CCC/Harvest, with some of the current Title IV systems and the EDCAPS project currently licensing the software. The product is expected to provide the scalability and flexibility required to support Project EASI/ED, including the Project EASI/ED subprojects, in both the near and long-term.

5. CONFIGURATION STATUS ACCOUNTING

Project EASI/ED configuration status accounting (CSA) is the administrative tracking and reporting of all Project EASI/ED CIs. CSA ties together all other CM functions: configuration identification, configuration control, and configuration audit. CSA ensures the storage of CM activity information for subsequent retrieval and reporting. Project EASI/ED CSA will enhance Project EASI/ED managers' capabilities to identify, produce, inspect, deliver, operate, maintain, and repair CIs in a timely, efficient, and economical manner.

The Project EASI/ED CM tool will act as the main repository (library) for storing, tracking, and reporting information related to Project EASI/ED CM activities. A supplemental physical library will also be created and maintained for storage of CIs that cannot be loaded into the CM tool.

The CMA will be responsible for implementing, operating, and maintaining the Project EASI/ED CM tool. The CMA will establish appropriate user groups and individual users in the CM tool, and will assign the appropriate permissions for access, check-out, and check-in. The CMA will also be responsible for the backup and recovery of the Project EASI/ED CM library.

CSA reporting activities will occur at two levels within Project EASI/ED:

1. Project EASI/ED subproject CCBs.
2. CMA.

Both of these levels will be responsible for producing reports to support their own activities, as well as producing reports required to support processes and procedures of other levels as outlined in this *CM Plan*.

Subsection 5.1 describes the CM library and CI check-out and check-in procedures. Subsection 5.2 describes the CM library backup and recovery processes and procedures. Subsection 5.3 describes the types of reports that will be provided, and details their content, format, and intended audience.

5.1 CM Library

The CM library will consist of a software tool to automate Project EASI/ED CM functions and a secure storage facility to store those portions of the CM library that cannot be maintained electronically.

The CM librarian will administer the Project EASI/ED CM library at the CMA level. The CM Librarian will review the CI information entered into the CM library to ensure consistency across all subprojects. If a CI's information is found to be erroneous in content or level of detail, the CM librarian will inform the CI originator and will request specific corrections. The originator will be responsible for correcting the CI's deficiencies within five business days.

The CM library will maintain a repository of all Project EASI/ED CIs and information related to those CIs. All CIs will be stored within the library in electronic format, if possible. In the case of CIs that must be stored in hard copy, their CI information will be entered into the CM library and a CI number will be assigned. The CI information will include a list of the items that are stored externally to the CM tool. The items stored as hard copy will each be labeled with the system-assigned CI number and will be stored in a secure location.

The CMA will have read-only access to the entire contents of the CM library. The CMA may inspect any CI at any time to determine what CI(s) and subprojects a proposed CR will impact, and what that impact will be to the CI(s) or subproject.

CM operations analysts will administer the CM library at the subproject level. The CM operations analysts will set permissions for CIs to allow specific subproject team members to check-in and check-out CIs. The

subproject team members allowed to access CIs will be identified by the subproject development team leader.

5.1.1 CI Check-out Procedure

The CI check-out procedure describes the process that an individual will follow to check out a CI from the CM library. This procedure will be used for all organizational levels of Project EASI/ED requiring check-out capabilities. Figure 5-1, below, illustrates the check-out procedure.

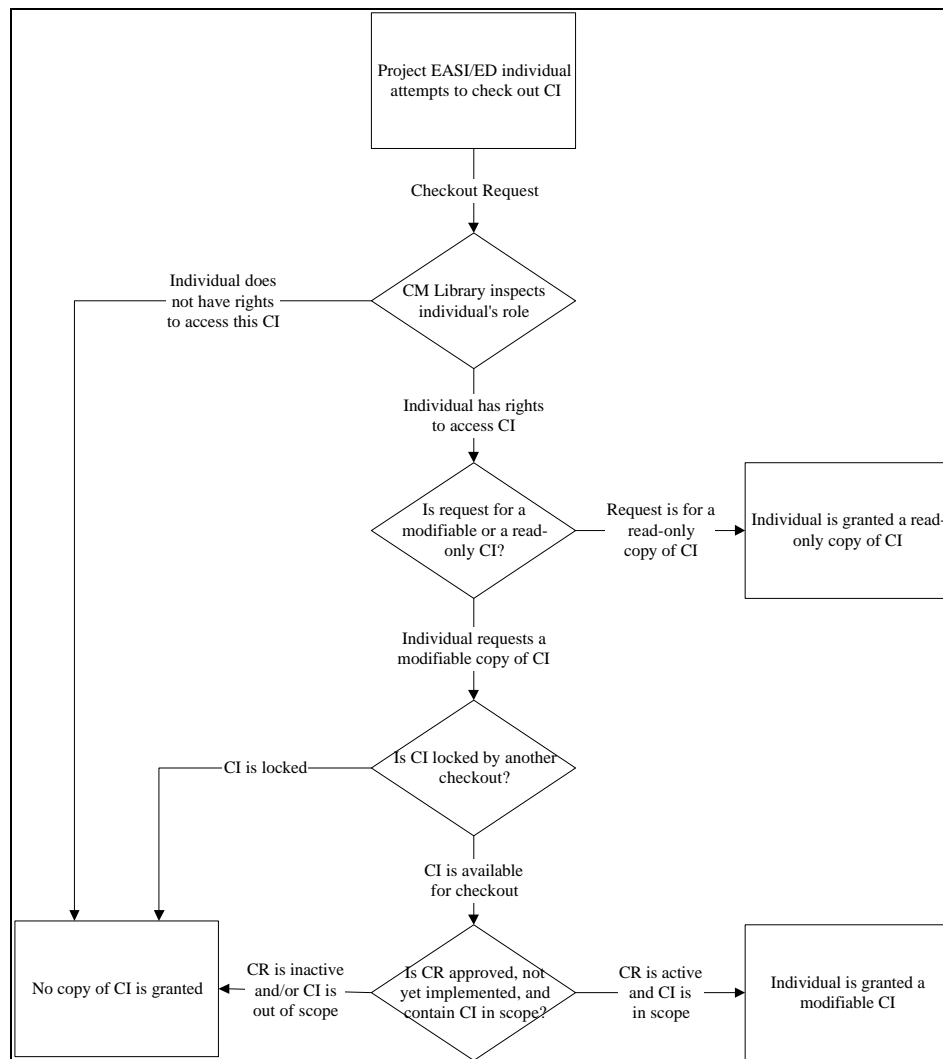


Figure 5-1. CI Check-out Procedure.

- Step 1.** An individual must submit a request to the CM library to check-out a CI.
- Step 2.** The CM library inspects the individual's role. If the individual has not been given permission to access the CI, and is not the CM librarian or a member of the CMA, a copy of the CI will not be granted.
- Step 3.** If the individual has rights to check-out the CI and has requested a read-only copy, the individual will be granted a copy.

- Step 4.** If the individual has sufficient rights to check-out the CI and has requested a modifiable copy, the CM library will check whether the CI has been “locked” by another modifiable checkout. If the CI is locked, a copy will not be granted.
- Step 5.** If the CI is not locked, the CM library will inspect the request for completeness, which requires a CR number. The referenced CR will be inspected to ensure it contains the CI in its scope, that the CR has been approved, and that the CR has not yet been completed.
- Step 6.** If the request and CR pass inspection, the requesting individual will be granted a modifiable CI and the CI will be locked in the CM library against further modifiable checkouts. Otherwise, a copy of the CI will not be checked out.

5.1.2 CI Check-in Procedure

This check-in procedure only applies to CIs checked out of the CM tool. Initial CI establishment and check in is described in Section 3.

- Step 1.** Only the individual who checked a CI out may check that CI into the CM library.
- Step 2.** The individual must include the CR number, a description of changes made, and a list of all individuals who contributed.
- Step 3.** The CR number must still be approved and not yet competed at check-in and the number must be the same CR number used to check out the CI.

5.2 Backup and Recovery Process and Procedures

The CM library backup and recovery processes and procedures provide comprehensive data backup and recovery capabilities. The processes and procedures allow CM library files to be recovered from as recently as the previous night, to as early as the beginning of the development effort. The CM librarian will ensure that all backup and recovery processes and procedures are followed.

If one or more CIs need to be recovered, a CM operations analyst will submit a request to the CM librarian. The request will specify which CI(s) need to be recovered.

5.2.1 Backup Process

Three forms of backups will be used: incremental, weekly, and monthly. Used together, these backups will provide comprehensive CM library file recovery. The CM library will be taken off-line every night to allow the CM library to be backed up. The CM library will come up again after the back up has finished. The backup and recovery software will bring the CM library on and off-line to provide maximum up time.

Incremental backups store all CM library files that were created or altered since the preceding backup, whether that backup was an incremental, weekly, or monthly backup. Incremental backups will be run every night except Friday, at which time weekly backups will be run as shown in Figure 5-2.

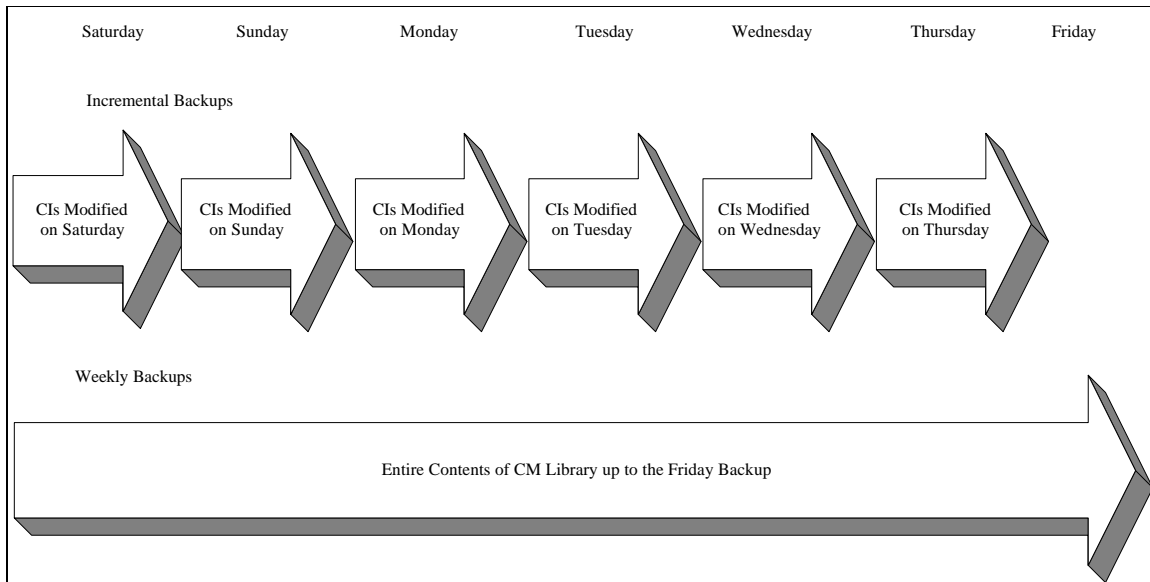


Figure 5-2. Incremental and Weekly CM Library Backups.

Incremental backups will store to a pool of tapes labeled “Incremental.” The pool capacity will be 25 times the size of the projected CM library size so it may store entire library contents every evening for one month. The incremental pool will not be removed from the backup device and will not be recycled for one month. This allows CM library files to be recovered from the end of any day for the previous month. In practice only a small fraction of the library will be backed up nightly, allowing a much greater range of time from which files may be recovered.

Weekly backups store the entire CM library and will be run every Friday night. The weekly backups are stored to a pool of tapes labeled “Weekly.” The weekly pool capacity will be two times the projected size of the CM library so it may contain entire CM library every week with room for unexpected growth. The weekly pool will be removed from the backup device every Monday morning. The weekly pool will be recycled every five weeks, which allows CM library files to be recovered from the end of any week for five weeks.

Monthly backups store the entire CM library. Monthly backups will be run on the first Friday night of every month immediately after the weekly backup, as shown in Figure 5-3. The monthly backups are stored to a pool of tapes labeled “Monthly.” The monthly pool capacity will be two times the projected library size so it may contain the entire CM library every week with room for unexpected growth. The monthly pool will be removed from the backup device the following Monday morning. The monthly pool will be stored off-site in a secure facility, which allows files to be recovered from the end of any month for the lifetime of Project EASI/ED.

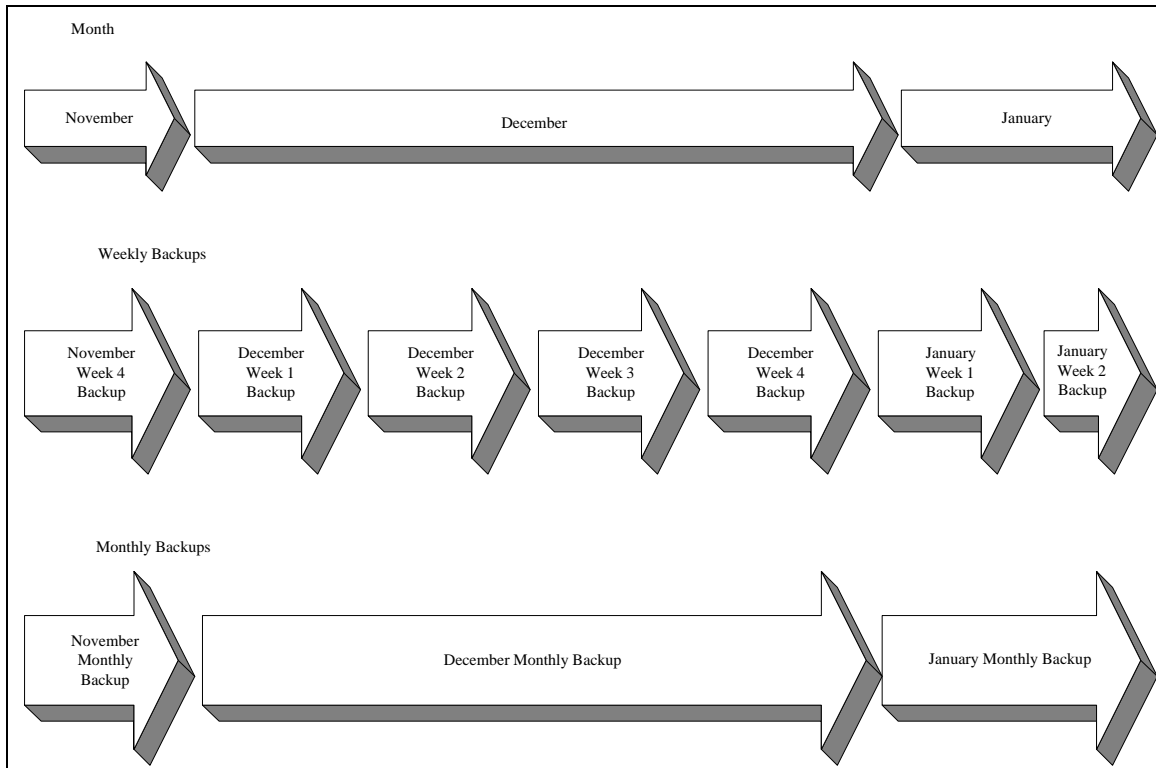


Figure 5-3. Weekly and Monthly CM Library Backups.

5.2.2 CM Library Backup Procedure

- Step 1.** CM librarian will perform all backups.
- Step 2.** Every night, except Friday, an incremental backup will occur. The incremental backup will store all files that have been modified or created since the previous backup, whether the backup was incremental, weekly, or monthly.
- Step 3.** Every Friday night the CM library will be shut down to allow full backups to be performed. The weekly backup will store the entire contents of the CM library every Friday.
- Step 4.** A monthly backup will be run the first Friday of every month, immediately after the weekly backup.
- Step 5.** The CM library will be brought back on-line automatically after the backup(s) have been completed.

Every Monday, the weekly and, if applicable, monthly backup tapes will be removed from the backup device. The monthly backup will be stored in a secure location off-site, while the weekly backup will be stored in a secure location on-site for five weeks before being recycled.

5.2.3 Recovery Process

To recover files from the previous two weeks, the files in question will be restored first from the most recent weekly backup preceding the loss. The compromised files will be restored then from each incremental backup following the weekly restoration up to the day that suffered the loss, as shown in Figure 5-4.

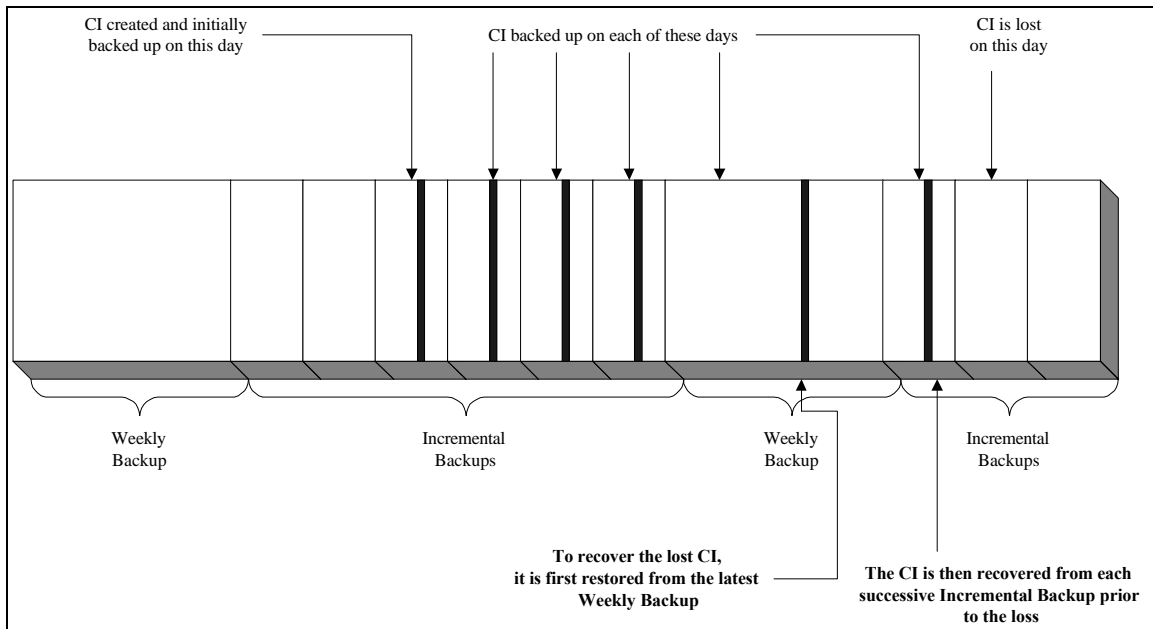


Figure 5-4. CI Recovery Process.

To recover files from the previous five weeks, the files will be restored first from the most recent weekly backup preceding the loss. The files will be restored then from each incremental backup following the weekly restoration up to the day that suffered the loss, if possible. Due to the nature of the incremental backups, if files are not often changed, the incremental pool of backups may store files much longer than the weekly backup, possibly up to several months.

To recover files from before the preceding five weeks, the CM library files first will be restored from the most recent monthly backup preceding the loss. The CM library files then will be restored from each incremental backup following the weekly restoration up to the day that suffered the loss, if possible.

In case of a catastrophe that compromises the entire on-site backup facility, files will only be recoverable from the monthly backups stored off-site.

5.2.4 Recovery Procedure

- Step 1.** A Project EASI/ED member will request the CM librarian to restore a portion of the CM library through a change request. At times, some or all of the CM library may be lost or compromised due to hardware or software failure or human error.
- Step 2.** The CM librarian must receive an approved CR.
- Step 3.** If the portion of the CM library in question was compromised within the preceding month:
- Lost or corrupted files will be restored from most recent weekly backup, if the files are old enough. If the files were not created prior to the most recent weekly backup, they will not have been backed up and this step will be skipped.
 - Files will be restored from each incremental backup prior to the day on which the loss was suffered.
- Step 4.** If the portion of the CM library in question was compromised longer than one month before the restoration request:
- Lost or corrupted files will be restored from most recent monthly backup.
 - Files will be restored from each incremental backup prior to the day on which the loss was suffered, if possible. If the incremental backup from the day of the loss was recycled, the files will not be able to be restored from the incremental backup and the recovery process will stop at the last available incremental backup.
- Step 5.** In the event of a catastrophe that compromises the entire CM library, files will be restored from the latest monthly backup stored off-site.

5.3 Configuration Management Reporting

Three types of reports will be produced: periodic, aperiodic, and ad hoc. Period reports will be produced according to the schedule of their specific audience. These reports will be produced and distributed by the CM librarian or a CM operations analyst to their target audience. The aperiodic and ad hoc reports may be created at any time by the CM librarian or a CM operations analyst. Any periodic report may also be produced on an as-needed basis.

Each CCB will be responsible for producing their own custom reports for their subproject.

5.3.1 Periodic Reports

Following is a listing of the minimum set of reports that will be produced by the CM tool.

- Class I CR Report.
- Class II CR Report.
- CR Review Report.
- Project EASI/ED CRs Report.
- Project EASI/ED CI Report.
- Project EASI/ED Baseline Report.
- Project EASI/ED System CI Report.
- Project EASI/ED CI Cross-Reference Report.
- CMA IA Report.
- Project EASI/ED FCA Report.
- Project EASI/ED PCA Report.
- Project EASI/ED CI Deficiencies Report.

5.3.1.1 Class I CR Report

The purpose of the Class I CR Report is to provide the CRB with information on the CRs that need to be addressed during their regular meetings. This report will list:

- New CRs that the CMA has received since the last CRB meeting.
- CRs for which the CMA has completed impact analysis.
- CRs on which the CMA has not completed the impact analysis.

This report will include the following key attributes:

- CR number.
- Name of the Project EASI/ED or Title IV system that is requesting the change.
- Description of the change being requested.
- Name(s) of Project EASI/ED subprojects and Title IV systems that are assigned this CR for impact analysis.
- Date the CR is submitted to Project EASI/ED subprojects and Title IV systems for impact review.
- Date when responses are due from Project EASI/ED subprojects and Title IV systems.
- Impact analysis based on the feedback received from Project EASI/ED systems and Title IV systems.
- System(s) the CR will impact.

This report will be sorted in descending order on the following attributes:

- Name of the Project EASI/ED subproject or Title IV system requesting the change.
- Class type.
- Date CR was received by the CMA.
- CR number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- CRB.

5.3.1.2 Class II CR Report

The purpose of the Class II CR Report is to provide the CRB with information on the Project EASI/ED Class II changes that the CMA approves or disapproves. This report will be provided to the CRB to keep them informed of all the changes to the system. The CRB will have the authority to override the CMA's decision on any Class II CR.

This report will include the following key attributes:

- CR number.
- Name of the Project EASI/ED subproject or Title IV system that is requesting the change.
- Description of the change being requested.
- System(s) the CR will impact.

This report will be sorted in descending order on the following attributes:

- Name of the Project EASI/ED subproject or Title IV system requesting the change.
- CR number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- CRB.

5.3.1.3 CR Review Report

The purpose of this report is to provide Project EASI/ED managers, Project EASI/ED subproject managers, and Title IV system managers a list of CRs that are assigned to them for review.

This report will include the following key attributes:

- CR number.
- Date the CR was delivered to Project EASI/ED Integration Support task and subprojects, and Title IV systems.
- Description of the change requested.
- Date when responses are due.

This report will be sorted in descending order on the following attributes:

- Date when responses are due.
- CR number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- Project EASI/ED subproject configuration manager.
- Title IV system configuration manager.

5.3.1.4 Project EASI/ED CR Report

The Project EASI/ED CR Report will be used by any segment of the CM organization, from the CCBs to the CRB, to provide all information needed relating to CRs. The Project EASI/ED CR Report will provide CR information stored in the CM library at any level in the CM organization.

This report will include the following key attributes:

- CR number.
- CR type (Class I or Class II).
- Description of the CR.
- Decision (approved/disapproved).
- CR's most recent workflow milestone.
- Date the CR was implemented.

This report will be sorted in descending order on the following attributes:

- Decision (approved/disapproved).
- CR class (I or II).
- CR number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- Subproject CCBs.
- CRB.

5.3.1.5 Project EASI/ED CI Report

The purpose of the Project EASI/ED CI Report will be to provide administrative assistance to the CRB, to Project EASI/ED managers, and to subproject managers in tracking pertinent CIs. This report will list all CIs that are in the CM tool.

This report will include the following key attributes:

- CI number.
- CI type (software, hardware, documentation, or system.)
- CI description.
- CI owner.

This report will be sorted in descending order on the following attributes:

- CI type.
- CI number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- CRB.
- Subproject CCBs.

5.3.1.6 Project EASI/ED Baseline Report

The purpose of the Project EASI/ED Baseline Report will be to display all components of a system baseline as well as their version numbers. This report will list all Project EASI/ED CIs that are included in the established baselines.

This report will include the following key attributes:

- Baseline type.
- CI number.
- CI type (software, hardware, documentation, or system.)
- CI description.
- CI components.

This report will be sorted in descending order on the following attributes:

- Baseline type.
- CI type.
- CI number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- Subproject CCBs.
- CRB.

5.3.1.7 Project EASI/ED System CI Report

The purpose of the Project EASI/ED System CI Report will be to assist the CMA in performing administrative duties, including the CM librarian's review of the CIs. This report will list Project EASI/ED system-level CIs that exist in the CM tool.

This report will include the following key attributes:

- System CI number.
- System CI description.
- System CI components.
- Name of subproject that submitted the system CI.
- Date the system CI was produced on.
- Other systems that the CI interfaces with.

This report will be sorted in descending order on the following attributes:

- Name of subproject that submitted the system CI.
- System CI number.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- CMA.
- Subproject CCBs.

5.3.1.8 Project EASI/ED CI Cross-Reference Report

The Project EASI/ED CI Cross-Reference Report will show the relationships between Project EASI/ED CIs and other Project EASI/ED or subproject CIs or Title IV system CIs. This report will assist the CMA and subprojects in performing CR impact analysis.

This report will include the following key attributes:

- CI number.
- CI type (software, hardware, documentation, or system).
- CI description.
- CI components.
- CIs mapped to the specified CI.

This report will be sorted in descending order on the following attributes:

- CI type.
- CI number.

This report will be produced by the following:

- Project EASI/ED configuration manager.
- Project EASI/ED subproject configuration manager.

This report will be distributed to the following:

- CMA.
- CCB.

5.3.2 Aperiodic Reports

The following is a list of the minimum set of aperiodic reports that will be produced by the CM organization:

- CMA Internal Audit (IA) Report.
- Project EASI/ED FCA Report.
- Project EASI/ED PCA Report.
- Project EASI/ED CI Deficiencies Report.

5.3.2.1 CMA IA Report

The purpose of the CMA IA Report will be to inform the Project EASI/ED project manager and integration manager of the state of Project EASI/ED CM performance. This report will contain the findings of the CMA IA. It will be written by the CMA IA scribe and will be approved by the configuration manager.

This report will include the following key attributes:

- The area of the Project EASI/ED CM organization that is being addressed in the report. These areas include the CM library and librarian, CMA, and subproject CCBs.
- CI's CM library entry check. Each CI's entry into the CM library is checked for completeness and accuracy.
- CM librarian's CI review check. Each CI will be checked to ensure the CM librarian reviewed the CI's entry to the CM library within a week of entry.
- CCB's CR review check. Each CR will be checked to ensure the CCB reviewed the CR's entry to the CM library within a week of entry.
- CR's CM library entry check. Each CR's entry into the CM library is checked for completeness and accuracy.
- CR life cycle review. Each CR must have followed the correct approval/disapproval procedure. Each closed CR must have been closed only by the authorized organization.
- A summary page briefly listing all deficiencies documented within the CMA IA, and referencing the location within the report which explains the deficiency in detail.

This report will be sorted in descending order on the following attributes:

- The area of the Project EASI/ED CM organization that is being addressed in the report.
- CI.
- CR.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- Project EASI/ED project manager and integration manager.

5.3.2.2 Project EASI/ED FCA Report

The Project EASI/ED Functional Configuration Audit (FCA) Report will contain the findings of the FCA. It will be written by the FCA scribe and will be approved by the CM manager. The Project EASI/ED FCA Report is the document used by the Project EASI/ED project manager and integration manager to determine whether a CI is ready for inclusion in a production baseline. If a CI is judged to not be ready, the Project EASI/ED configuration manager will produce a Project EASI/ED CI Deficiencies Report that will be used by the CI development team to correct deficiencies, and by the FCA Team to limit the scope of their audit to include only those areas found to be deficient previously.

This report will include the following key attributes:

- The CI identifiers.
- The CR identifiers.
- The CI initial check-in review. Each CI's initial check in to the CM library is reviewed to ensure it followed established Project EASI/ED CM procedures.
- CM librarian's CI review check. Each CI will be checked to ensure the CM librarian reviewed the CI's entry to the CM library within a week of entry.
- CCB's CR review check. Each CR will be checked to ensure the CCB reviewed the CR's entry to the CM library within a week of entry.
- CR's CM library entry check. Each CR's entry into the CM library is checked for completeness and accuracy.
- CI's CM library check-in/out review. Each CI will be checked to ensure it followed proper CM library check-in and check-out procedures.
- A summary page briefly listing all deficiencies documented within the FCA, and referencing the location within the report which explains the deficiency in detail.

This report will be sorted in descending order on the following attributes:

- CI.
- CR.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- Project EASI/ED project manager.
- Project EASI/ED integration manager.

5.3.2.3 Project EASI/ED PCA Report

The Project EASI/ED Physical Configuration Audit (PCA) Report will contain the findings of the PCA. It will be written by the PCA scribe and will be approved by the CM manager. The Project EASI/ED PCA Report is the document used by the Project EASI/ED project manager and integration manager to determine whether a CI is ready for inclusion in the production baseline. If a CI is judged to not be ready the Project EASI/ED configuration manager will produce a Project EASI/ED CI Deficiencies Report that will be used by the CI development team to correct deficiencies, and by the PCA Team to limit the scope of their audit to include only those areas found to be deficient previously.

This report will include the following key attributes:

- The CI identifiers.
- The CR identifiers.
- The CRs that are related to each CI.
- The CIs that are related to each CR.
- CI's CR implementation check. Each CI will be checked to ensure that it properly implemented all CRs.
- CI's life cycle check. Each CI will be checked to ensure that it was reviewed/tested at the predetermined points, and that it passed the examinations.
- Whether the CI has the correct version number.
- CR's CM library entry check. Each CR's entry into the CM library is checked for completeness and accuracy.
- Whether the CI matches the version stored in the CM library.
- A summary page briefly listing all deficiencies documented within the FCA, and referencing the location within the report which explains the deficiency in detail.

This report will be sorted in descending order on the following attributes:

- CI identifiers.
- CR identifiers.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- CRB.

5.3.2.4 Project EASI/ED CI Deficiencies Report

The purpose of the Project EASI/ED CI Deficiencies Report will be to guide the CI development team in making corrections, and the FCA or PCA Team in a follow-up audit. The Project EASI/ED configuration manager will write the Project EASI/ED CI Deficiencies Report. The report will be produced after an FCA or PCA that discovered deficiencies in the CI that prevented it from inclusion in the production baseline.

This report will include the following key attributes:

- The CI identifiers.
- The CR identifiers.
- Deficiencies noted for each CI.
- Deficiencies noted for each CR.

This report will be sorted in descending order on the following attributes:

- CI identifiers.
- CR identifiers.
- CRs that are related to each CI.
- CIs that are related to each CR.

This report will be produced by the following:

- Project EASI/ED configuration manager.

This report will be distributed to the following:

- CMA or subproject CCB.

5.3.3 Ad Hoc Reports

Ad hoc reports will be produced by the CM librarian or by a CM operations analyst and may be requested by any member of Project EASI/ED. Ad hoc reports may report on any fields recorded in the CM library.

6. CONFIGURATION AUDIT

Project EASI/ED configuration audits will ensure that all CM processes and procedures for configuration management are being followed, are effective, and are efficient. Additionally, configuration audits will ensure that a CIs' functionality accurately reflects the requirements, specifications, and CRs associated with its development.

The CMA will perform three types of audits:

1. CMA Internal Audits (IA).
2. Functional Configuration Audits (FCA).
3. Physical Configuration Audits (PCA).

CMA internal audits will check the CM library for consistency. FCAs will ensure that each CI's development followed the developmental methodology requirements of the Project EASI/ED subproject. The PCAs will ensure that the correct CIs are delivered.

6.1 CMA Internal Audit Procedure

The CMA IA reviews the Project EASI/ED CM library and CM organization. The CMA IA ensures that the CM library is providing full CM capabilities and that the CM organization is effectively and efficiently adhering to Project EASI/ED CM processes and procedures.

The CMA IA will provide answers to the following:

- Have Project EASI/ED CM process and procedures been adhered to?
- Have Project EASI/ED CM procedures been followed in processing change requests?
- Do all component CIs exist and are they up-to-date?
- Is the CM library up to date?
- Is the CM library being backed up?
- Are all reports being fully produced in a timely manner?

The CMA will conduct a minimum of one CMA IA per year.

6.1.1 Inputs

1. Random samples of hardware, software, and documentation CIs from across Project EASI/ED and each subproject. Subprojects that either have no CIs in the CM library or have not submitted a CR since the previous CMA audit will not contribute CIs to the audit.
2. A random sample of CRs. Every subproject that is contributing CIs to the audit should have at least one CR that it initiated and reviewed.
3. A random sample of reports produced.

6.1.2 Output

The CMA IA report.

6.1.3 Roles

CMA CM Manager: Appoints individuals from the CMA to each role within the audit. Reviews and authorizes release of the CMA IA Report.

Facilitator: Leads the CMA IA effort and controls the audit.

CMA IA Team Members: Review the CIs, CRs, and reports; inspect the backup facility.

Scribe: Creates the CMA IA agenda. Records actions items, issues, and decisions made by the CMA IA members. Creates the CMA IA minutes and CMA IA Report.

CM Librarian and CM Operations Analysts: Supply necessary inputs for the CMA IA. Answer questions and supply additional materials to the CMA IA team during the course of the audit. Provide access to the backup facility.

6.1.4 Steps

- Step 1.** The CMA IA team will select from the Project EASI/ED and from each subproject five percent of the CIs of each type that exists in the system or subsystem. At least one CI of each type that exists in a system will be reviewed. For example, subproject A has 100 software CIs, four hardware CIs and no documentation CIs. Subproject A would have five software CIs reviewed, one hardware CI, and no documentation CIs chosen for auditing.
- Step 2.** The CM librarian will provide the CMA IA team with requested CIs, CRs, and reports not later than 48 hours prior to the beginning of the CMA IA.
- Step 3.** The CMA IA facilitator will create an agenda for the CMA IA based on the scope of the materials provided, and will distribute the agenda to the CMA IA members not later than 24 hours prior to the beginning of the CMA IA.
- Step 4.** The CMA IA team will review all CIs for completeness. The CMA IA team will check that the CM librarian reviewed all CIs at the point they were initially entered into the tool.
- Step 5.** The CMA IA team will review all CRs for completeness. The CMA IA team will check that all CRs followed proper approval procedures. The CMA IA team will also check that all completed CRs followed proper approval/disapproval procedures before being completed. All CRs that have been neither approved nor disapproved for more than 30 days will be noted.
- Step 6.** The CMA IA team will review all reports for completeness of content. The CMA IA will check that the reports were produced in a timely fashion.
- Step 7.** The CMA IA team will inspect the backup facility. The CMA IA team will check that backups are being run, and that monthly backups are being stored off-site.
- Step 8.** The facilitator will review all findings with the CMA IA team.
- Step 9.** The scribe will create minutes documenting the audit and distribute them to all participants. The scribe will produce the CMA IA report reflecting the outcome of the CMA IA and deliver it to the CMA CM manager.

Step 10. The Project EASI/ED configuration manager will review and approve/disapprove the CMA IA Report. The configuration manager will deliver the approved CMA IA Report to the Project EASI/ED project manager, the Project EASI/ED integration manager, and to all subproject managers whose subprojects were included in the audit, and to the involved subproject configuration managers. The Project EASI/ED configuration manager will send disapproved CMA IA Reports back to the CMA IA team with a list of deficiencies to be corrected.

6.2 Functional Configuration Audit Procedure

The Project EASI/ED FCA reviews Project EASI/ED CI development. FCAs are used to ensure that CIs are developed according to Project EASI/ED CM standards. The FCA inspects CIs to verify that they have passed through all defined stages of the development life cycle.

The Project EASI/ED configuration manager will conduct an FCA on all CIs that comprise the production baseline immediately prior to its establishment. CIs may not be baselined unless they pass an FCA to the satisfaction of the Project EASI/ED manager and the Project EASI/ED integration manager.

If the Project EASI/ED project manager or Project EASI/ED integration manager determines from the FCA report that CIs should not be implemented as a production baseline, the Project EASI/ED configuration manager will produce a CI deficiencies report. The CI deficiencies report will be sent to the CI's development team. The development team responsible for the CI(s) in question will make corrections to the CI(s) based on the CI deficiencies report. The CMA will use the CI deficiencies report while conducting any follow-up FCA audits.

The FCA will provide answers to the following:

- Have Project EASI/ED CM standards been properly followed?
- Have Project EASI/ED CM procedures been followed in conducting change?
- Are all related CIs up to date?
- Did all CIs follow proper CM library check-in/check-out procedures?
- Did the CM librarian inspect all initial CI check-ins?
- Did the CM librarian inspect all CRs?

6.2.1 Inputs

1. The entire CI record for those CIs constituting the baseline as stored in the CM library.
2. A listing of each CR associated with every CI provided for the FCA.

6.2.2 Output

The FCA Report.

6.2.3 Roles

Project EASI/ED Project Manager and Integration Manager: Approves/disapproves the CI for inclusion in the production baseline.

Project EASI/ED Configuration Manager: Appoints individuals from the CMA to each FCA position. Reviews and authorizes release of the FCA Report. Produces a CI deficiencies report in the event of a disapproved CI.

Facilitator: Leads the FCA effort and controls the audit.

FCA Members: Review the CIs and CRs.

Scribe: Creates the FCA agenda. Records actions items, issues, and decisions made by the FCA members. Produces the FCA minutes and FCA Report.

CM Librarian and CM Operations Analysts: Supply necessary inputs for the FCA. Answer questions and supply additional materials to the FCA team during the course of the audit.

6.2.4 Steps

- Step 1.** The CM librarian will provide the FCA team with the requested CI records and their related CRs not later than 48 hours prior to the beginning of the FCA.
- Step 2.** The FCA facilitator will create an agenda for the FCA based on the scope of the materials provided, and distribute the agenda to the FCA members not later than 24 hours prior to the beginning of the FCA.
- Step 3.** The FCA team will check that all CIs' initial check-in to the CM library followed established Project EASI/ED CM procedures.
- Step 4.** The FCA team will check that the CM Librarian reviewed all CIs for completeness within 1 week of their initial entry to the CM library.
- Step 5.** The FCA team will check that the CM librarian reviewed all CRs for completeness within one week of their entry to the CM library.
- Step 6.** The FCA team will check that all CIs were checked in and out of the CM library according to Project EASI/ED CM procedures.
- Step 7.** The facilitator will review all findings with the FCA team.
- Step 8.** The scribe will create minutes documenting the audit and distribute them to all participants. The scribe will produce the FCA report reflecting the outcome of the FCA and deliver it to the CMA CM manager.
- Step 9.** The CMA CM manager will review and approve/disapprove the FCA report. The CMA CM manager will deliver the approved FCA Report to the Project EASI/ED project manager, the Project EASI/ED integration manager, and the audited subproject manager and configuration manager (as applicable). The Project EASI/ED configuration manager will send disapproved FCA reports back to the FCA team with a list of deficiencies to be corrected.
- Step 10.** The Project EASI/ED project manager and integration managers will make one of three decisions based on the FCA report:

- No deficiencies are sighted; the CI may be included in the production baseline in its current form.
- The production baseline is created and subsequently minor, non-functional deficiencies cited in the FCA Report are corrected.
- The CI is not included in the production baseline and instead will be returned to its development team with a CI deficiencies report detailing all deficiencies that must be corrected. The CI may not be included in a production baseline until it passes a FCA that addresses the same CI deficiencies report submitted to the CI development team.

Step 11. The FCA will audit the corrections made to deficiencies. This procedure will then resume at Step 8 and will continue until all deficiencies are resolved.

6.3 Physical Configuration Audit Procedure

The Project EASI/ED PCA reviews Project EASI/ED CI development. PCAs are used to ensure CIs are being developed and tested according to Project EASI/ED standards.

PCAs are conducted concurrently with FCAs. The PCA will answer the following:

- Did all CIs properly implement all CRs?
- Do the CIs accurately reflect their design and development requirements?
- Were all CIs reviewed and tested at the predetermined points, and did the CIs pass the examinations?
- Is the CI the correct version number?
- Does the physical CI match the version stored in the CM library?

6.3.1 Inputs

1. The CM library record for the CI that is being audited.
2. The records for CRs implemented as part of the CI's development.

6.3.2 Output

The PCA Report.

6.3.3 Roles

Project EASI/ED Project Manager and Integration Manager: Approves/disapproves the CI for inclusion in the production baseline.

Project EASI/ED Configuration Manager: Appoints individuals from the CMA to each position on the audit team. Reviews and authorizes release of the PCA Report. Produces a CI deficiencies report in the event of a disapproved CI.

Facilitator: Leads the PCA effort and controls the audit.

PCA Members: Review the CI and CRs.

Scribe: Creates the PCA agenda. Records actions items, issues, and decisions made by the PCA members. Creates the PCA minutes and PCA Report.

CM Librarian and CM Operations Analysts: Supply necessary inputs for the PCA. Answer questions and supply additional materials to the PCA team during the course of the audit.

6.3.4 Steps

- Step 1.** The CM Librarian will provide the PCA team with the requested CI and CRs not later than 48 hours prior to the beginning of the PCA.
- Step 2.** The PCA facilitator will create an agenda for the PCA based on the scope of the materials provided, and distribute the agenda to the PCA members not later than 24 hours prior to the beginning of the PCA.
- Step 3.** The PCA team will check that all CRs related to the CIs were implemented. For example, a software CI's code would be inspected to ensure that the functionality called for in a CR was properly implemented.
- Step 4.** The PCA team will inspect to confirm that the CI was tested and that those tests were passed.
- Step 5.** The PCA team will check that all CIs audited are the correct versions, and that they match the CM library baseline for their individual release.
- Step 6.** The PCA team will check that the documentation for the CI affected by implemented CRs was changed as a result of the CR.
- Step 7.** The facilitator will review all findings with the PCA team.
- Step 8.** The scribe will create minutes documenting the audit and distribute them to all participants. The scribe will produce the PCA Report reflecting the outcome of the PCA and will deliver it to the Project EASI/ED configuration manager.
- Step 9.** The Project EASI/ED configuration manager will review and approve/disapprove the PCA Report. The configuration manager will deliver the approved PCA Report to the Project EASI/ED project manager, the Project EASI/ED integration manager, and to the subproject manager and configuration manager (as appropriate). The Project EASI/ED configuration manager will send disapproved PCA reports back to the PCA team with a list of deficiencies to be corrected.

Step 10. The Project EASI/ED project manager and integration manager will make one of three decisions based on the PCA Report:

- No deficiencies are sighted; the CI may become part of the production baseline in its current form.
- The CI becomes part of the production baseline, and subsequently minor, non-functional deficiencies cited in the PCA report are corrected.
- The CI is not implemented as part of the production baseline and instead will be returned to its development team with a CI deficiencies report detailing all deficiencies that must be corrected. The CI may not go be implemented in a production baseline until it passes a PCA that addresses the same CI deficiencies report submitted to the CI development team.

Step 11. The PCA will audit the corrections made to deficiencies. This procedure will then resume at Step 8 and will continue until all deficiencies are resolved.

7. CONFIGURATION MANAGEMENT TRAINING

This section identifies the kinds and amounts of training required to ensure effective performance of CM activities by the Project EASI/ED staff and by Project EASI/ED subproject staff. The CMA will be responsible for ensuring that all training courses and related materials are developed.

CM training will address three distinct areas:

- Concepts of CM.
- Project EASI/ED CM.
- CM Tool.

The Concepts of Configuration Management and Project EASI/ED Configuration Management training will each be covered in two separate courses. Course I will consist of an overview of the CM discipline and an overview of Project EASI/ED CM. Course II will provide a more detailed review of the CM discipline and a detailed review of Project EASI/ED CM. The actual length of each course will be determined by the final volume of information covered in each, test runs of actual presentations, and the developers and participants of the courses. The length of time devoted to the separate sections within the courses will be tailored to meet the needs of the particular training session. Topics to be covered in both courses should include:

- Overview of CM functions.
- Concepts of baselines.
- Configuration items.
- Configuration identification.
- Identification schemes.
- Configuration control.
- Configuration status accounting.
- Configuration auditing.
- CM responsibilities.

All members of the Project EASI/ED team will be required, as a minimum, to attend Course I. Those members of the Project EASI/ED team in the CMA or a CCB and those members of the Project EASI/ED integrator or a Project EASI/ED subproject with a high degree of involvement in CM activities, as determined by each subproject manager or Project EASI/ED integration manager, respectively, will be required to take Course II. Attendance of Course II waives the requirement to attend Course I.

The CMA will conduct all training. Courses will be taught within the first 30 days after subproject initiation or when there are sufficient new members of the Project EASI/ED team, as determined by the Project EASI/ED configuration manager, with approval from the Project EASI/ED project manager or integration manager, or at the Project EASI/ED integration manager's or configuration manager's discretion.

The CM Tool training will consist of two distinct courses:

- CM Tool Administration, Developer, and Maintenance.
- CM Tool User.

The CM Tool Administration, Developer, and Maintenance course will be the technical training for installation, setup, technical operation and maintenance, and customized development of the CM tool. The developer portion of the course will provide training in developing and maintaining the database or repository used by the tool, development of customized menus (screens) and reports, day-to-day operation support, troubleshooting, and training in supporting the user community. This course will be attended by at least two CMA team members. The course will be provided by the CM tool vendor or authorized

representative and will be augmented with an on-call service or telephone support capability to avoid severe learning curve problems as the tool initially is put into operation.

The CM Tool User course will train users how to use the tool in order to perform the required activities of CM for Project EASI/ED. This course will be taught by the CMA once the tool has been installed and customized to support Project EASI/ED CM processes and procedures. This course will be attended by at least two representatives of a subproject's CCB and two representatives from the subproject's development team and will be formally taught within the first 30 days after the creation of the subproject's CCB. As subproject members are identified as users of the CM tool, they must also attend this course. The course will also be available in a self-study version for individuals who join a subproject after the initial formal course is taught. This course can be formally taught at any point with approval from the Project EASI/ED configuration manager and the Project EASI/ED integration manager.

8. CONTRACTOR AND VENDOR CONFIGURATION MANAGEMENT CONTROL

This section describes the methods used to ensure contractor/subcontractor compliance with CM requirements. It also describes the CM controls that apply to vendors. For purposes of this *CM Plan* the following definitions apply:

- **Contractor/Subcontractor** - Any company, government agency or organization, private agency, or individual awarded or hired to perform or support the development/operation of deliverables/products as a Project EASI/ED subproject.
- **Vendor** - A supplier of COTS software products or hardware that will be used to support the development or operation of Project EASI/ED.

8.1 Contractor/Subcontractor Requirements

Each contractor/subcontractor providing services to Project EASI/ED is required to comply with the *Project EASI/ED CM Plan*. The contractor/subcontractor will:

- Develop a CM plan documenting in detail their CM processes and procedures.
- Use the Project EASI/ED-authorized CM tool and the centralized data repository to establish and administer CM for their particular tasking.
- Establish a CCB, as described in Section 2 of this *CM Plan*, within 30 days of subproject initiation. In the event that the contractor/subcontractor is unable to meet the 30 day requirement, a waiver request will be submitted to the Project EASI/ED configuration manager within 15 days of subproject initiation, outlining an alternative implementation schedule for the CCB.
- Have all staff complete appropriate CM training, as described in Section 7 of this *CM Plan*, within 30 days of subproject initiation. In the event that the contractor/subcontractor is unable to meet the 30 day requirement, a waiver request will be submitted to the Project EASI/ED configuration manager within 15 days of subproject initiation, outlining an alternative implementation schedule for training.
- Use the configuration item identification schema when assigning CI numbers to CIs.
- Incorporate the system, subsystem, and individual CI life cycle reviews and baselines detailed in this *CM Plan* into the subproject CM plan.
- Use the CR classification schema when developing CRs.
- Define subproject CM processes and procedures so that the CR review and approval process and procedures in the *Project EASI/ED CM Plan* are maintained.
- Recognize the CM organizational components and hierarchy established in Section 2 of this *CM Plan*.

8.2 Vendor Configuration Management Controls

Vendor products will be put under configuration control within Project EASI/ED. Vendor products will be:

- Inspected at delivery to ensure that the products delivered meet the specifications of the purchase agreement and the requirements of their intended operating environment.
- Logged into the CM library and assigned a CI number before the end of the construction phase.
- Part of the subproject test baseline that is established at the end of the construction phase.
- Tested as part of subproject unit and system tests.
- Part of the product and production baselines.

In addition to logging the product into the Project EASI/ED CM library, the owner of the product will also fill out all warranty and proof-of-purchase cards and ensure that they are returned to the vendor/manufacturer. This will help ensure that the Project EASI/ED owner of the vendor product is notified regarding product upgrades and new version releases.

APPENDIX A

ACRONYMS AND DEFINITIONS

ACRONYMS AND DEFINITIONS

The following list shows acronyms and abbreviations that are used in this document.

BARD	Business Area Requirements Document
CCB	Configuration Control Board
CDR	Critical Design Review
CI	Configuration Item
CIRB	Configuration Identification Review Board
CM	Configuration Management
CMA	Configuration Management Administration
COTS	Commercial Off-The-Shelf
CR	Change Request
CRB	Change Review Board
CSA	Configuration Status Accounting
EASI	Easy Access for Students and Institutions
ED	U.S. Department of Education
FCA	Functional Configuration Audit
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PM	Program Manager
QA	Quality Assurance
SRR	Software Requirements Review
SSR	Software Specification Review
TIVWAN	Title IV Wide Area Network
TRR	Test Readiness Review

APPENDIX B

GLOSSARY

GLOSSARY

ALLOCATED BASELINE - Allocated baseline is established at the end of the design phase to document the allocation of functional requirements to specific software systems or subsystems and to document the specific documentation, hardware, system software, and communications configuration items comprising the technical architecture

BASELINE - A “baseline” identifies an agreed-to description of a system at a point in time and provides a known configuration from which changes are addressed. The baseline provides the foundation for change control for individual CIs, subproject baselined CIs and system CIs.

CONFIGURATION AUDIT - A formal examination of a CI. Two types of configuration audits exist: the Functional Configuration Audit (FCA) and the Physical Configuration Audit (PCA). These two types are further defined in this section. *[MIL-STD-973]*

CONFIGURATION CONTROL - Configuration control begins after CIs are formally identified. Configuration control refers to the evaluation, coordination, approval or disapproval, and implementation of changes. It also involves managing release of, and changes to, system components throughout the system life cycle. Configuration control answers the following: *What is controlled? How are changes to system components controlled? and Who controls system changes?*

CONFIGURATION CONTROL BOARD (CCB) - A group of people responsible for evaluating and approving or disapproving proposed changes to configuration items, and for ensuring implementation of approved changes. *[IEEE Std 610.12]*

CONFIGURATION IDENTIFICATION - Configuration identification involves classifying a system's structure, uniquely identifying individual system components (CIs), and documenting the components' functional and physical characteristics. Configuration identification includes:

- Selection of CIs.
- Establishment of a baseline for system CIs.
- Issuance of numbers and other identifiers affixed to the CIs.

CONFIGURATION ITEM (CI) - A CI is any item that project or subproject management wants to place under configuration control. Project EASI/ED CIs will be classified into three primary categories: documentation, software, and hardware.

CONFIGURATION MANAGEMENT (CM) - A discipline applying technical and administrative direction and surveillance to: identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, record, and report change processing and implementation status, and verify compliance with specified requirements. *[IEEE Std 610.12]*

CHANGE REQUEST (CR) - A CR is a formal request by an individual to change a CI within Project EASI/ED. A CR may involve changes to individual hardware, software, or documentation CIs, or it could require changes to multiple CIs in combination.

COMPUTER SOFTWARE (or SOFTWARE) - A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions. *[MIL-STD-498]*

CONFIGURATION STATUS ACCOUNTING (CSA) - Configuration Status Accounting (CSA) is the administrative tracking and reporting of all Project EASI/ED CIs. CSA ties together all other CM functions: configuration identification, configuration control, and configuration audit. CSA ensures the storage of CM activity information for subsequent retrieval and reporting.

DELIVERABLE - A system or component that is obligated contractually to a customer or intended user.

FUNCTIONAL BASELINE - Functional Baseline is established at the end of the definition phase to facilitate the multiple, parallel implementation approach. The functional baseline established at the end of the definition phase will initially allocate subsystem and data across a proposed architecture.

FUNCTIONAL CONFIGURATION AUDIT (FCA) - The Project EASI/ED FCA reviews Project EASI/ED CI development. FCAs are used to ensure that CIs are developed according to Project EASI/ED CM standards. The FCA inspects CIs to verify that they have passed through all defined stages of the development life cycle.

LIBRARY - A library containing computer readable and human readable information relevant to a system development effort.

PRODUCT BASELINE - Product baseline is established at the end of the system test phase to document the implementation version of the system being delivered for user acceptance testing.

PRODUCTION BASELINE - Production baseline is established at the end of system implementation, prior to operation, to document the production release and version of the system.

PHYSICAL CONFIGURATION AUDIT (PCA) - The Project EASI/ED PCA reviews Project EASI/ED CI development. PCAs are used to ensure CIs are being developed and tested according to Project EASI/ED standards.

REVIEW - An activity by which the progress of a project is assessed relative to its technical or contractual requirements. The review is conducted at logical transition points in the development effort to identify and correct problems resulting from the work completed thus far before the problems can disrupt or delay the technical progress. The review provides a method for the contractor and the client to determine that the development of a CI and its documentation have met the defined requirements.

SOFTWARE DEVELOPMENT - A set of activities that results in software products. Software development may include the development, modification, reuse, reengineering, maintenance, or any other activities that result in software products. *[MIL-STD-498]*

SOFTWARE UNIT - An element in the design of a software item; for example, a major subdivision of a software item, a component of that subdivision, a class, object, module, function, routine, or database. Software units may occur at different levels of a hierarchy and may consist of other software units. Software units in the design may or may not have a one-to-one relationship with the code and data entities (routines, procedures, databases, data files, etc.) that implement them or with the computer files containing those entities. *[MIL-STD-498]*

SOFTWARE TEST ENVIRONMENT - A set of automated tools, firmware devices, and hardware necessary to test software. The automated tools may include but are not limited to test tools such as simulation software, code analyzers, test case generators, path analyzers, etc. and may also include the tools used in the software engineering environment. *[MIL-STD-498]*

VERSION - Version control refers to the identification of the points in a CI's life when a new version must be created, and the rules surrounding the assignment of a new version number.

TEST BASELINE - Test baseline is established at the end of the unit test phase to document the version of documentation, software and hardware submitted for system testing.

APPENDIX C
PROJECT EASI/ED
CONFIGURATION MANAGEMENT PROCEDURES

PROJECT EASI/ED CONFIGURATION MANAGEMENT

CONFIGURATION REVIEW BOARD PROCEDURES

I. OBJECTIVE

The Configuration Review Board (CRB) will have the responsibility and authority to review and make approval/disapproval decisions regarding all formally submitted Class I CRs and all formally submitted Class II CRs from the Project EASI/ED Integration Support task relating to documentation, hardware, and software items that are under formal configuration control within Project EASI/ED.

II. INPUTS

1. CRB Meeting Agenda.
2. Class I CR Report.
3. Class II CR Report.
4. CMA Internal Audit Report (When Applicable).

III. OUTPUTS

1. Class I and II Approved, Disapproved, or Deferred CRs.
2. Notification to the CMA of the decisions for each CR.
3. CRB Minutes.

IV. ROLES

Facilitator: Leads the CRB effort and controls the meeting. Creates and presents the CRB meeting agenda, identifies issues and/or action items, monitors tracking of unresolved issues, and coordinates and manages the interface with the CMA.

CRB Members: The CRB members will review CRs and provide approval, disapproval, or deferral decisions.

Scribe: Prepares all required information identified in Section II of this procedure. Records actions items, issues, and decisions made by the CRB members. Tracks unresolved action items/issues. Creates the CRB minutes. Notifies the CMA of CRB decisions. In cases where the CRB decision overturns the CCB decision, a CRB Decision Rational will be prepared and provided to the CMA for delivery to the originating CCB. Prepares all required information identified in Section II of this procedure. Inputs appropriate information into CM tool.

Project EASI/ED, Title IV System Representative(s): A representative of Project EASI/ED and its subprojects and Title IV systems will be present. These representatives must have a detailed understanding of the functional, technical, and operational impacts that the CRs being reviewed may have on Project EASI/ED, its subprojects or Title IV system. This representative must be able to effectively communicate these aspects and impacts of the CR and answer questions asked by CRB members.

V. PROCEDURE STEPS

1. The CRB scribe will produce all required reports for the CRB and deliver them to the CRB facilitator 48 hours prior to the CRB meeting.
2. The CRB facilitator will create an agenda based upon the information in the required reports provided by the scribe and will distribute the agenda, plus all CR documentation, to the CRB members no later than 24 hours prior to the CRB meeting.
3. The CRB will review all CRs. Each CR will be discussed by the CRB members and either approved, disapproved, or deferred for further review. CRs that are deferred for further review are returned to the CMA with specific information regarding why a decision was not made and what the CRB requires in order to assist it in making a decision. These deferred CRs must be resubmitted by the CMA in order to be reviewed by the CRB. CRs that have not had their impact analysis completed will also be reviewed. The CRB will determine the importance of the CR and will be allowed to request the acceleration of the impact analysis or will make a decision with no impact analysis available.
4. The Facilitator will review any issues that are outstanding and assign action items to CRB members as appropriate.
5. With the Facilitator's support and concurrence, the Scribe will create minutes documenting the meeting and distribute them to all attendees, load all appropriate information into the CM tool, notify the CMA who will notify all affected parties of CRB decisions and/or actions, and will produce and distribute all required reports.

PROJECT EASI/ED CONFIGURATION MANAGEMENT

CONFIGURATION CONTROL BOARD PROCEDURE

I. OBJECTIVE

The Configuration Control Board (CCB) will be responsible for ensuring that configuration management (CM) within a subproject is executed in accordance with the Project EASI/ED subproject CM Plan and Project EASI/ED CM Plan. The CCB will have the authority to review and make approval/disapproval decisions regarding all formally submitted CRs relating to documentation, hardware, and software items that are under the formal configuration control of their subproject, with the provision that all Class I CRs must also be reviewed and ultimately approved or disapproved by the CRB.

II. INPUTS

1. CCB Meeting Agenda.
1. Project EASI/ED CI Report.
2. Project EASI/ED CR Report.

III. OUTPUTS

1. Class I Approved/Disapproved CRs.
2. Class II Approved/Disapproved CRs.
3. CRs Deferred, Requires Additional Information or Action by Originator.
4. CCB Minutes.

IV. ROLES

Facilitator: Leads the CCB effort and controls the meeting. Creates and presents the CCB meeting agenda, identifies issues and/or action items, monitors tracking of unresolved issues, and coordinates and manages the interface with the CMA.

CCB Members: The CCB members will review CRs and provide approval/disapproval decisions. CCB members will review CRB approval/disapproval decisions for their CRs and forward the results to affected parties.

Scribe: Prepares all required inputs identified in Section II of this procedure. Records actions items, issues, and decisions made by the CCB members. Tracks unresolved action items/issues. Creates the CCB minutes. Prepares all required outputs identified in Section III of this procedure. Inputs appropriate information into CM tool. Responsible for notifying originator and any affected groups within the subproject.

CR Representative(s): A representative for each CR being reviewed and a representative from any affected group inside the subproject must be present at the CCB meeting. These representatives must have a detailed understanding of the functional, technical, and operational aspects for the CR as well as the functional, technical, and operational impacts that the change will have on the subproject. These representatives must be able to effectively communicate these aspects and impacts of the CR and answer questions asked by CCB members.

V. PROCEDURE STEPS

1. The CCB scribe will ensure that all required information for the CCB meeting is produced and delivered to the CCB facilitator 48 hours prior to the CCB meeting.
2. The CCB facilitator will create an agenda based upon the information provided by the scribe and will distribute the agenda, plus all CR documentation, to the CCB members no later than 24 hours prior to the CCB meeting.
3. The CCB will review all Class I CRs first, then Class II. Each CR will be discussed by the CCB members and either approved, disapproved, or deferred for further review. Originators of all Class I and Class II CRs and those affected by the CRs will be notified of the CCB's decision. Originators of approved Class II CRs may begin implementation of the change, originators of approved Class I CRs must wait for the CMA impact determination and the CRB's decision before implementation of the change can begin. Originators of Class I or II CRs that are deferred for further review are returned to the originator with specific information regarding why a decision was not made and what the CCB requires in order to assist it in making a decision. These deferred CRs must be resubmitted by the originator in order to be reviewed by the CCB.
4. The CCB will review and forward all Class I CRs that have been reviewed by the CRB and returned with a decision. If the CRB approved the CR then it may be implemented. If the CRB disapproved the CR, the CCB will review and discuss the CR and decide whether the decision of the CRB regarding the CR should be accepted or whether the CR should be modified and re-submitted.
5. The Facilitator will review any issues that are outstanding and assign action items to CCB members as appropriate.
6. With the Facilitator's support and concurrence, the Scribe will create minutes documenting the meeting and distribute them to all attendees, load all appropriate information into the CM tool, notify all affected parties of CCB decisions and/or actions, and will produce and distribute all required reports.